Environmental Protection Agency

40 CFR Part 90

[FRL-5942-9]

RIN 2060-AE29

Phase 2 Emission Standards for New Nonroad Spark-Ignition Nonhandheld Engines At or Below 19 Kilowatts

AGENCY: Environmental Protection Agency (EPA)

ACTION: Notice of Final Rulemaking

SUMMARY: In this action, EPA is finalizing a second phase of emission regulations to control emissions from new nonroad spark-ignition nonhandheld engines at or below 19 kilowatts (25 horsepower). These engines are used principally in lawn and garden equipment in applications such as lawnmowers and garden tractors. The standards will result in an estimated 59 percent reduction of emissions of hydrocarbons plus oxides of nitrogen from those achieved under the

current Phase 1 standards applicable to nonhandheld engines. The standards will result in important reductions in emissions which contribute to excessively high ozone levels in many areas of the United States.

In compliance with the Paperwork Reduction Act, this document announces that the information collection requirements contained in the proposed rule have been submitted to the Office of Management and Budget for approval.

DATES: The amendments to 40 CFR part 90 are effective **[60 days after publication in the Federal Register]**. The information collection requirements contained in 40 CFR 90 are effective **[the date of publication in the Federal Register]**.

ADDRESSES: Materials relevant to this proposal, including the Final Regulatory Impact Analysis are contained in Public Docket A-96-55, located at room M-1500, Waterside Mall (ground floor), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. The docket may be inspected from 8:00 a.m. until 5:30 p.m., Monday through Friday. A reasonable fee may be charged by EPA for copying docket materials.

For further information on electronic availability of this final rulemaking, see "SUPPLEMENTARY INFORMATION" below.

FOR FURTHER INFORMATION CONTACT: Robert Larson, U.S. EPA, Engine Programs

and Compliance Division, (734) 214-4277; larson.robert@epa.gov.

SUPPLEMENTARY INFORMATION:

Table of Contents

1. Carry-Over Certification

2. Small Volume Engine Manufacturer Definition

3. Small Volume Engine Family Definition

4. Flexibilities for Small Volume Engine Families and Small Volume Engine Manufacturers

5. Flexibilities for Small Volume Equipment Manufacturers and Small Volume Equipment Models

6. Small Volume Equipment Manufacturer Definition

7. Small Volume Equipment Model Definition

8. Hardship Provision

F. Nonregulatory Programs

1.Voluntary “Green” Labeling Program

2.Voluntary Fuel Spillage Reduction Program

G. General Provisions

1. Model Year and Annual Production Period Flexibilities

2. Definition of Handheld Engines

3. Small Displacement Nonhandheld Engine Class

4. Liquefied Petroleum Gas Fueled Indoor Power Equipment

5. Dealer Responsibility

6. Engines Used in Recreational Vehicles and Applicability of the Small SI Regulations to Model Airplanes

7. Engines Used in Rescue and Emergency Equipment

8. Replacement Engines

9. Record keeping and Information Requirements

10. Engine Labeling

11. Emission Warranty

12. Other

III. Projected Impacts

A. Environmental Benefit Assessment

1. Roles of HC and NOx in Ozone Formation

2. Health and Welfare Effects of Tropospheric Ozone

3. Estimated Emissions Impact of Final Regulations

4. Health and Welfare Effects of CO Emissions

5. Health and Welfare Effects of Hazardous Air Pollutant Emissions

6. Particulate Matter

B. Costs and Cost-Effectiveness

1. Engine Technologies

2. Engine Costs

3. Equipment Costs

4. Operating Costs

5. Cost Per Engine and Cost-Effectiveness

IV. Public Participation

V. Administrative Requirements

A. Administrative Designation and Regulatory Analysis

B. Regulatory Flexibility

C. Paperwork Reduction Act

D. Unfunded Mandates Reform Act

E. Congressional Review Act

F. National Technology Transfer and Advancement Act

G. Executive Order 13045

H. Executive Order 12875: Enhancing the Intergovernmental Partnership

I. Executive Order 13084: Consultation and Coordination with Indian tribal Governments

VI. Statutory Authority

Regulated entities

Entities potentially regulated by this action are those that manufacture or introduce into commerce new nonhandheld small spark-ignition nonroad engines or equipment. Regulated categories and entities include:

Category	Examples of Regulated Entities
Industry	Manufacturers or importers of new nonroad small (at or below 19 kW) spark-ignition nonhandheld engines and equipment.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your company is regulated by this action, you should carefully examine the applicability criteria in section §90.1 of title 40 of the Code of Federal Regulations. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding "FOR FURTHER INFORMATION CONTACT" section.

Obtaining Electronic Copies of the Regulatory Documents

The preamble, regulatory language and Final Regulatory Impact Analysis (Final RIA) are also available electronically from the EPA Internet Web site. This service is free of charge, except for any cost already incurred for Internet connectivity. The electronic version of this final rule is made available on the day of publication on the primary Web site listed below. The EPA Office of Mobile Sources also publishes Federal Register notices and related documents on the secondary Web site listed below.

1. http://www.epa.gov/docs/fedrgstr/EPA-AIR/
   (either select desired date or use Search feature)
2. http://www.epa.gov/OMSWWW/

(look in What's New or under the specific rulemaking topic)

Please note that due to differences between the software used to develop the document and the software into which the document may be downloaded, changes in format, page length, etc., may occur.

I. Introduction

A. Background

On January 27, 1998, EPA issued a Notice of Proposed Rulemaking (NPRM) proposing a second phase of regulations to control emissions from new handheld and nonhandheld nonroad SI engines at or below 19 kilowatts (25 horsepower) ("small SI engines") (63 FR 3950). This action was preceded by a March 27, 1997, Advanced Notice of Proposed Rulemaking (62 FR 14740). EPA solicited comment on virtually all aspects of the NPRM. EPA held a public hearing on February 6, 1998, and the public comment period for the NPRM closed March 13, 1998. Today's action finalizes this rulemaking activity for nonhandheld engines in adopting a Phase 2 set of emission standards and compliance program requirements for Class I and Class II nonhandheld engines. EPA is not at this time finalizing a Phase 2 program for handheld engines, as described in more detail below. EPA will further address the Phase 2 program for handheld engines in future Federal Register notices.

Today's action is taken in response to Section 213(a)(3) of the Clean Air Act which requires EPA's standards for nonroad engines and vehicles to achieve the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available, giving appropriate consideration to cost, lead time, noise, energy and safety factors. The standards and other compliance program requirements being adopted today satisfy this Clean Air Act mandate.

The NPRM contained lengthy discussion of the proposed standards, the expected costs of their implementation, and the potential costs and benefits of adopting more stringent standards such as those that were then under consideration by the California Air Resources Board (ARB). In the NPRM, EPA explicitly asked for comment regarding the level of the proposed standards and the impacts and timing for implementing more stringent standards, so as to allow it to establish the most appropriate standards in the final rule. In particular, EPA requested comment on the impacts and timing for implementing emission standards that would require the same types of technology as anticipated by proposed rules under consideration at that time by the California ARB.

After the close of the comment period and upon reviewing the information supplied during the comment period, EPA determined that it was desirable to get further details regarding the technological feasibility, cost and lead time implications of meeting standards more stringent than those contained in the NPRM. EPA's NPRM already contained estimates of the costs and feasibility of more stringent standards. Some commenters had charged that, based on these

discussions, EPA's proposed standards would not be stringent enough to satisfy the stringency requirements of Clean Air Act Section 213(a)(3). For the purpose of gaining additional information on feasibility, cost and lead time implications of more stringent standards, EPA had several meetings, phone conversations, and written correspondence with specific engine manufacturers, with industry associations representing engine and equipment manufacturers, with developers of emission control technologies and suppliers of emission control hardware, with representatives of state regulatory associations, and with members of Congress. EPA also sought information relating to the impact on equipment manufacturers, if any, of changes in technology potentially required to meet more stringent standards than were contained in the NPRM. Additionally, EPA received numerous comments on the NPRM requesting closer harmonization with the compliance program provisions adopted by the State of California. In some cases, EPA also discussed these harmonization issues with manufacturers and industry association representatives to improve the Agency's understanding of the needs and benefits to the industry of such harmonization.

As EPA has stated on prior occasions, in adopting this final rule EPA wished to consider all relevant information that became available during the rule development process. This includes information received during the comment period on the NPRM, and, to the extent possible, important information which became available after the formal NPRM comment period had concluded. To the extent that post-NPRM information has expanded or updated the knowledge of the Agency regarding technological feasibility, production lead time estimates for incorporating improved designs, costs to manufacturers, costs to consumers and similar factors, it

is reasonable to expect that the improved information may result in changing assessments of how a pending rule can best achieve regulatory goals compared to what had been expected at the time of the NPRM. This is especially true in the case of a rulemaking concerning an industry, like small SI engines, that is undergoing relatively rapid technological innovation.

EPA published a Notice of Availability highlighting the additional information gathered in response to the NPRM (see 63 FR 66081, December 1, 1998). After analyzing this information, the Agency concluded that more stringent standards for Class I nonhandheld engines, used in applications such as residential lawn mowers, consistent with those adopted by California are indeed achievable on the national scale. This final rule for nonhandheld engines adopts emission standards considerably more stringent than those proposed for Class I nonhandheld engines. The technologies (principally conversion of side-valve engines to clean overhead valve designs) that EPA anticipates will be used in achieving compliance with the Class I standard are well known and were discussed in the NPRM.

However, since the publication of the NPRM, there have been rapid advances in emission reduction technologies for handheld engines. EPA has received information which could potentially support handheld standards much more stringent that those proposed in the NPRM. In light of this new information, and in the interest of providing an opportunity for public comment on this new technology and on more stringent levels for handheld engine emission standards, EPA intends to address Phase 2 regulations for handheld engines (such as trimmers, brush cutters, and chainsaws) in a separate Supplemental Notice of Proposed Rulemaking

(SNPRM) in June of 1999, with a final rule in March of 2000.

The reader is referred to the Notice of Availability, the NPRM itself, as well as to the docket for this rulemaking, for the range of additional information upon which the Agency has relied in adopting this final program for small SI nonhandheld engines.

B. Overview of Final Program

The following provides an overview of the provisions in these Phase 2 rules for nonhandheld engines. Additional detail explaining the program as well as discussion of information and analyses which led to the adoption of these requirements is contained in subsequent sections.

As proposed and consistent with Phase 1 rules, these Phase 2 rules distinguish between engines used in handheld equipment and those used in nonhandheld equipment. In today's action, Phase 2 emission standards are set for distinct engine size categories referred to as "engine classes" within the nonhandheld engine equipment designation. The following table summarizes the HC+NOx emission standards for Class I and Class II nonhandheld engines and when these standards take effect for each engine class.

Table 1

Phase 2 HC +NOx Emission Standards for Class I and Class II

Engine Class	NPRM		FRM	
	HC+NOx (g/kW-hr)	Time Line	HC+NOx (g/kW-hr)	Time Line
Class I	25.0	2001	16.1	August 1, 2007; in addition, any Class I engine family initially produced on or after August 1, 2003 must meet the Phase 2 Class I standards before they may be introduced into commerce.
Class II	12.1	2001-2005	12.1	2001-2005

As indicated in this table, the emission standards being finalized for Class I engines are considerably more stringent than the base emission levels included in the proposal. This reflects the Agency's analysis of the information EPA received in direct response to the questions posed in the NPRM concerning the desirability and feasibility of more stringent standards than the base levels proposed, as well as other information made available to the Agency before and since the proposal. The level of these standards will result in an estimated 59 percent annual reduction in combined hydrocarbon and oxides of nitrogen (HC+NOx) emissions from these small SI nonhandheld engines compared to the Phase 1 emission requirements for these engines when the effects of this Phase 2 rule are fully phased in.

Another feature of the Phase 2 nonhandheld standards is that they are phased in over a number of years, allowing the manufacturers an orderly and efficient transition of engine designs and technologies from those complying with the existing Phase 1 standards to those necessary to meet the Phase 2 requirements. Thus, for example, the manufacturers of Class II engines are required to meet a gradually decreasing standard on average for this segment of their product line

during model years 2001 through 2005. During this time frame, EPA anticipates that such a manufacturer would continue to change more and more of its Class II engines designs to designs capable of meeting the final 12.1 g/kW-hr standards, averaging emission performance with older designs and thus meeting on average the declining standard in effect for that model year (see preamble Section II.A.2). Finally, by 2005 in this example, the manufacturer would have had sufficient time and resources to change the designs and production tooling to meet the 12.1 g/kW-hr standard on average for all its Class II engines. Similarly, a two-stage schedule has been developed to uniquely meet the industry needs for converting the Class I engines. For these nonhandheld classes, EPA has concluded that the phased-in and two-stage implementation schedules are necessary in order to make the ultimate standards achievable through the application of the specific technologies that EPA analyzed for nonhandheld engines.

These standards and the other compliance program elements being adopted today also consider expected in-use deterioration. In contrast to the Phase 1 rules which only regulate the emission performance of engines when new, the Phase 2 standards being adopted today also reflect expected deterioration in emission performance as an engine is used. Manufacturers will be required to evaluate the emission deterioration performance of their engine designs and certify their designs to meet these standards after anticipated emission deterioration of a typical in-use engine over its useful life. Different useful life ranges have been adopted based on the type of engine and equipment in which the engine is installed. For example, a Class II nonhandheld engine will be certified for from 250 to 1000 hours of use based on design features and the intended use of the installation (a high priced piece of industrial equipment would more likely be

equipped with an engine with design features intended to make it most durable and thus certified to the emission standards assuming 1000 hours of in-use operation, for example).

The certification program requires that the manufacturer determine an appropriate methodology for accumulating hours of operation to "age" an engine in a manner which duplicates the same type of wear and other deterioration mechanisms expected under typical consumer use which could affect emission performance. EPA expects bench testing will be used to conduct this aging operation because this can save time and perhaps money, but actual in-use operation (e.g., cutting grass) will also be allowed. Emission tests will be conducted when the engine is new and when it has finished accumulating the equivalent of its useful life. The engine must pass standards both when it is new and at the end of its designated useful life to qualify for certification. Additionally, the new engine and fully aged engine emission test levels are compared to determine the expected deterioration in emission performance for other engines of this design; such engines may be tested as they come off the end of a production line, in which case their new engine emission levels are adjusted by the deterioration factor determined from the certification engine to predict useful life emission performance.

Selection of engines for testing as they come off the production line will be conducted according to the provisions of the Production Line Testing (PLT) program. This program is explained in more detail in a following section but, briefly, its intent is to allow a sampling of engines as produced throughout the production period to be tested for emission performance to assure that the design intent as certified prior to production has been successfully transferred by

the manufacturer to mass production in a production line setting. The volume of PLT testing required by the manufacturer depends on how close the test results from the initial engines tested are to the standards; if these test engines indicate the design is particularly low emitting, few engines need be tested, while those designs with emission levels very close to the standards will need additional tests to make sure the design is being produced with acceptable emission performance.

While this compliance program will not require the manufacturer to conduct any in-use testing to verify continued satisfactory emission performance in the hands of typical consumers, an optional program for such in-use testing is being provided. EPA believes it is important for manufacturers to conduct in-use testing to assure the success of their designs and to factor back into their design and/or production process any information suggesting emission problems in the field. While not mandating such a program, EPA encourages such testing by allowing a manufacturer to avoid the cost of the PLT program for a portion of its product line by instead supplying data from in-use engines. Under this voluntary in-use testing program, up to twenty percent of the engine families certified in a year can be designated for in-use testing by the manufacturer. For these families, no PLT testing will be required for two model years including that model year. Instead, the manufacturer will select a minimum of three engines off the assembly line or from another source of new engines and emission test them when aged to at least 75 percent of their useful life under typical in-use operating conditions for this engine. The information relating to this in-use testing program will be shared with EPA. If any information derived from this program indicates a substantial in-use emission performance problem, EPA

anticipates the manufacturer will seek to determine the nature of the emission performance problem and what corrective actions might be appropriate. EPA will offer its assistance in analysis of the reasons for unexpectedly high in-use emission performance and what actions might be appropriate for reducing these high emissions. Whether or not a manufacturer chooses to conduct such a voluntary in-use testing program, EPA may choose to conduct its own in-use compliance program. If EPA were to determine that an in-use noncompliance investigation was appropriate, the Agency expects it would conduct its own in-use testing program, separate from this voluntary manufacturer testing program, to determine whether a specific class or category of engines is complying with applicable in-use standards.

All these general provisions of this compliance program are also expected to become part of California's compliance program for these classes of small engines.[1] Importantly, the testing and data requirements, engine family descriptors, compliance statements and similar testing and information requirements of these federal Phase 2 nonhandheld regulations are, to the best of EPA's knowledge, the same general compliance program requirements adopted by the California ARB. This is advantageous to manufacturers marketing the same product designs in California as in the other states, as they need prepare only one set of certification application information, supplying one copy to the ARB for certification in the State of California and one copy to EPA for federal certification. This similar treatment under the regulations also extends to the PLT program and the optional in-use testing program, such that any test data and related information

[1]While the voluntary in-use test program may not be codified in the California ARB Tier 2 rules for these engines, the ARB has agreed to adopt this same voluntary in-use test program and allow for the same decreased PLT testing.

developed for the ARB should also satisfy the federal regulatory requirements being adopted today.

In addition to the regulatory provisions outlined above, this rule adopts special provisions for small volume engine manufacturers, small volume engine families produced by other engine manufacturers, and small volume equipment manufacturers who rely on other manufacturers to supply them with these small SI nonhandheld engines. These special small volume provisions lessen the demonstration requirements and in some cases delay the effective dates of the standards so as to smooth the transition to these Phase 2 requirements. This is especially important for these small volume applications since the eligible manufacturers involved may not have the resources to ensure that engines complying with these Phase 2 standards will be available under the time frames otherwise established under these regulations. Since these provisions are limited to small volume applications, the risk to air quality is negligible. However, without these provisions, the economic impacts to small volume manufacturers could be increased and the possibility of reduced product offering would be great, especially for those products intended to serve niche markets which satisfy special needs. These flexibilities are explained more fully in section II.B. and are detailed in the regulations.

II. Content of the Final Rule

The following sections provide additional detail on the provisions of the final rule outlined above.

A. Emission Standards and Related Provisions

1. Class Structure

This final rule maintains the same basic class structure as implemented in the Phase 1 regulations for these nonhandheld engines. The Phase 1 rules established separate classes based on engine size in recognition of the greater difficulty in controlling emissions from smaller displacement engines compared to larger displacement engines. That rule also separated engine classes into those intended for use in equipment typically carried by the operator during its use such as chain saws or string trimmers (referred to as handheld equipment) and those engines normally used in equipment which is not carried by the operator including, for example, lawnmowers and generators (this equipment being referred to as nonhandheld). These usage distinctions seemed appropriate because the small engine industry is for the most part split between these two categories, with very few manufacturers making both handheld engines and nonhandheld engines, and because the nature of these two industry segments is quite different with, for example, the handheld engine manufacturers for the most part producing engines specifically for use in their own equipment (i.e., engine and equipment manufacturers) while nonhandheld engine manufacturers typically do not also make equipment but rather are suppliers of engines to the equipment industry; other characteristics important to regulatory analysis also differ between these two industry segments. Thus, it still seems appropriate to consider these industries separately, and thus the class structure adopted today maintains the distinction between handheld and nonhandheld classes, with today's rule establishing the Phase 2 program for

nonhandheld Class I and Class II. In addition, as discussed above, a Phase 2 program for handheld engines is not being adopted in today's action, but will be addressed in future Federal Register notices.

2. HC+NOx Emission Standards

More stringent HC+NOx emission standards are being finalized for Class I engines than were proposed, and the HC+NOx emission standards for Class II engines are being adopted as proposed. The Clean Air Act at section 213 (a) (3) requires the Agency to adopt standards that result in the greatest emission reductions achievable through the application of technology which the Administrator determines will be available, giving appropriate consideration to cost, lead time, noise, energy and safety factors. As a result of information now available, much of it in the form of comments received during the NPRM comment period, EPA has determined that standards more stringent than those proposed for Class I engines are feasible during the next decade. With the adoption of these Class I and Class II standards, emissions will be reduced an estimated 59 percent compared to the Phase 1 nonhandheld engines. The standards being adopted today reach the goal of maximum achievable reductions for nonhandheld engines under section 213 of the Clean Air Act. The nation should continue to benefit from improved emission performance for this category of engines at least through 2010 as these standards take effect and fleet turnover to cleaner engines occurs.

The following table compares the proposed levels of standards and the final levels of

standards being adopted today.

Table 2

Phase 2 HC +NOx Emission Standards for Class I and Class II

Engine Class	NPRM		FRM	
	HC+NOx (g/kW-hr)	Time Line	HC+NOx (g/kW-hr)	Time Line
Class I	25.0	2001	16.1	August 1, 2007; in addition, any Class I engine family initially produced on or after August 1, 2003 must meet the Phase 2 Class I standards before they may be introduced into commerce.
Class II	12.1	2001-2005	12.1	2001-2005

For Class I, the NPRM acknowledged that a standard of the level being adopted today was technically feasible. Indeed, one of the technology changes available to achieve these standards (adopting an overhead valve configuration) has already been done on some Class I engines and is also anticipated to be a primary choice for manufacturers of Class II engines to meet their Phase 2 emission levels. The issues impacting a decision on the most appropriate Class I standards, rather, concerned the lead time necessary for the industry to convert their Class I designs and production facilities to meet these standards, the cost of this conversion, and the subsequent potential adverse impact on sales of any such increase in cost passed along to consumers. Both the industry and EPA now have an improved understanding of the lead time necessary to convert Class I engines to designs capable of meeting these low emission standards and the costs that would result. While the manufacturers' uncertainties regarding consumer

acceptance may not be fully resolved, EPA believes the anticipated price increases resulting from this action will not have a significant adverse impact on sales, principally due to the fact that once fleet turnover becomes significant and Class I overhead valve engine products do not have to compete with side-valve engine products, consumer acceptance of overhead valve engines should no longer be an issue. Furthermore, major manufacturers of Class I engines support the adoption of these standards in the time frame required[2]. Specifically, Class I engines must all meet the 16.1 g/kW-hr HC+NOx standard starting with engines produced on or after August 1, 2007. Additionally, all new engine families first produced on or after August 1, 2003 will also need to comply with this standard. This latter provision recognizes that manufacturers adopting new engine designs in a time frame so close to the 2007 production requirement to meet the standard should be anticipating meeting that standard in their design strategy. Furthermore, sufficient time exists between now and August 1, 2003 to allow for new designs to meet the Phase 2 standard. Finally, EPA expects the manufacturers will take advantage of this production window between August 2003 and August 2007 to smooth the transition to a fully complying product line by August 2007 by phasing in production of Phase 2 engines during these four years. Thus, the environment should benefit by the early introduction of complying engines, and the manufacturers will benefit by the flexibility to introduce engines during this transition period in a manner and schedule which best fits their individual needs.

This standard for Class I engines is identical to the standard adopted by the State of

[2]See docket A-96-55, memorandum IV-E-68, entitled "Meeting with Tecumseh Products Company, Briggs & Stratton and Latham & Watkins".

California as part of its Tier 2 regulations for this class of small spark-ignition engines. However, these federal regulations tend to allow additional time in consideration of the need to convert perhaps additional designs not targeted, at least initially, for the California market, and of the significantly greater cost and logistical burden of converting production facilities to meet the much larger federal sales volumes. Nevertheless, this alignment in standards should assist the industry in targeting production and distribution of engines since, when fully implemented, an engine meeting California standards will also meet federal standards (and vice versa); such an engine can be sold anywhere in the United States.

While EPA anticipates manufacturers may choose to meet the Class I Phase 2 standard by converting their engines to OHV designs (similar to the case for Class II engines as explained in the NPRM), other options are also available such as the adoption of improved fuel metering and/or the use of a catalytic converter. The standards adopted today do not rely on only one technology, nor do they mandate use of any specific technology.

As proposed, the final rule adopts standards of 12.1 g/kW-hr HC+NOx for Class II engines, phased in over the 2001 through 2005 model years. Again, when coupled with the actions being taken with regard to Class I engines, this standard and phase in schedule is technically feasible and provides sufficient lead time for changing engine designs and production facilities.

2. NMHC+NOx Standards for Class I and II Natural Gas Fueled Engines

As proposed, EPA is adopting separate optional standards for small SI nonhandheld engines fueled by natural gas. For typical gasoline-fueled engines, the methane portion is around 5 to 10 percent of total hydrocarbons. However, for engines fueled with natural gas, the methane portion can be around 70 percent. The methane from these engines has a very low ozone forming potential compared to the other hydrocarbons in the engine's exhaust. Therefore, from an ozone forming potential perspective, it is appropriate to provide an alternative set of emission standards for engines fueled with natural gas. These standards have been adjusted to provide equivalent stringency to the HC+NOx standards for gasoline-fueled engines as are being adopted today. Aside from these standards, all other aspects of this rule pertain equally to engines fueled with natural gas as those fueled with gasoline.

Table 3

Phase 2 NMHC +NOx Emission Standards for Class I and II

Engine Class	NMHC+NOx (g/kW-hr)	Time Line
Class I	14.8	August 1, 2007; in addition, any Class I engine family initially produced on or after August 1, 2003 must meet the Phase 2 Class I standards before they may be introduced into commerce.
Class II	11.3	2001-2005

4. CO Emission Standards

This final rule adopts the CO emission standards contained in the proposal for Class I and

Class II engines (e.g., 610 g/kW-hr), and thereby maintains the same CO emission standard as in the Phase 1 rules (e.g., 519 g/kW-hr), when adjusted for deterioration. At this time, it does not appear that additional reductions in CO emissions from these engines will be needed to allow most areas of the country to attain the CO ambient air quality standard. However, it should be noted that many of the emission control techniques likely to be adopted to meet the Phase 2 HC+NOx standards, in particular the conversion from side-valve to clean overhead valve designs, improved fuel metering, and combustion chamber improvements, should also result in lower CO emissions. So, although the final CO standard remains the same as the proposed standard, EPA expects some CO emission reduction will occur as a result of the technology adopted to comply with the more stringent HC+NOx standards. EPA is not able at this time, however, to quantify the expected level of CO reductions to a sufficiently precise degree that the Agency can confidently set a more stringent standard than was proposed.

5. Useful Life Categories

Along with adopting a more stringent numerical standard for Class I engines, the minimum certification demonstration useful life has also been extended from 66 hours to 125 hours. The higher useful life designation is technically appropriate; the lower 66 hour value was proposed as a means of saving the industry cost during certification demonstration (see discussion in the NPRM, at 63 Federal Register 3969). However, the extra cost is relatively small while the higher hours of operation provide an improved opportunity to assess emission deterioration. Additionally, the 125 hour designation is aligned with California's requirements.

Thus, a manufacturer intending to sell Class I engines in both the State of California and federally (the vast majority of engines) would have to accumulate 125 hours of service during certification to meet the California requirement; in this case, no extra burden is placed on the manufacturer by adopting this requirement federally. The minimum certification demonstration useful life for Class II engines is 250 hours, as proposed.

6. Selection of Useful Life Category

EPA proposed that the engine manufacturers would be responsible for assuring that the correct useful life was used for certification demonstration and labeling purposes (see proposed 90.105(a)). Specific criteria were proposed which the manufacturers could use in documenting their determinations of useful life category selection. Comments received suggested such a requirement was overly rigid and unnecessary. EPA remains very concerned that the manufacturers select the most appropriate useful life category for each engine to assure it is properly evaluated during certification and to assure that any averaging, banking and trading program which allows the exchange of emission credits across engine families in different useful life categories is also fair and environmentally sound. However, so as not to add potentially unnecessary burden on the industry, these rules adopt a less rigid methodology for determining useful life categories. The proposal provided for EPA intervention in the selection of the appropriate useful life category for an engine. This potential intervention would have the effect of adding uncertainty for the manufacturer, and of limiting its ability to fully plan and execute in a timely fashion its product certification program. The program being adopted today rests the

responsibility with the industry to make their best, most conscientious selection. We expect that manufacturers of Class I and II engines will have a good idea of the types of equipment their engines are typically used in and, from their marketing information, a reasonably accurate projection of the relative volumes in such typical applications. Additionally, based on design features these manufacturers build into their engines, they have a good idea of the expected useful life in such applications. Relying on this information, manufacturers should be able to make good selections of appropriate useful life categories for their engines. While these final rules leave that responsibility to the manufacturer, EPA expects to periodically review the manufacturers' decisions to assure ourselves that this regulation is being properly implemented and to determine whether modifications to these rules are appropriate. We note that this approach results in the same regulatory requirement as the State of California, eliminating any extra burden in this regard due to federal rules.

7. Emission Standards Feasibility at Longer Useful Life

In response to the NPRM, some commenters suggested the standard should be proportionately higher for engines certified to higher useful life ages. The reasoning given was that since engines are expected to have emissions deterioration with accumulation of hours of use, the more the hours of use the higher the amount of deterioration and thus the higher should be the standards. However, this presumes no design difference between an engine intended for a useful life of, for example, 250 hours versus one designed for a useful life of 1000 hours. This is not the case. Engines designed for higher useful life markets have superior design features (such

as advance fuel metering designs including fuel injection) which should result in an ability to calibrate for lower emissions when the engine is new and also have a lower rate of emission deterioration during service accumulation. The combined impact of such trends will allow engines designed for a high useful life to meet the same standards as engines designed for a shorter useful life. Thus, these final rules adopt the same standard for all engines in a nonhandheld class regardless of their intended useful life.

B. Averaging, Banking, and Trading

In this final rule, EPA is establishing a certification averaging, banking, and trading (ABT) program for Phase 2 nonroad SI nonhandheld engines at or below 19 kW. Averaging means the exchange of emission credits among engine families within a given engine manufacturer's product line. Averaging allows a manufacturer to certify one or more engine families to Family Emissions Limits (FELs) above the applicable emission standard. However, the increased emissions would have to be offset by one or more engine families certified to FELs below the same emission standard, such that the average emissions in a given model year from all of the manufacturer's families (weighted by various parameters including engine power, useful life, and number of engines produced) are at or below the level of the emission standard. Banking means the retention of emission credits by the engine manufacturer generating the credits for use in future model year averaging or trading. Trading means the exchange of emission credits between engine manufacturers which then can be used for averaging purposes, banked for future use, or traded to another engine manufacturer.

The new program would be the first ABT program for nonroad SI engines, since the Phase 1 rule did not include an ABT program. EPA believes this new program is an important element in making the stringent Phase 2 emissions standards adopted in this final rule achievable with regard to technological feasibility, lead time, and cost. The new ABT program is intended to enhance the flexibility offered to engine manufacturers that will be needed in changing their entire product lines to meet the stringent HC + NOx standards being adopted. The ABT program also encourages the early introduction of cleaner engines certified under the Phase 2 requirements, thus securing earlier emission benefits.

EPA believes that the new ABT program is consistent with the statutory requirements of section 213 of the Clean Air Act. Although the language of section 213 is silent on the issue of averaging, it allows EPA considerable discretion in determining what regulations are most appropriate for implementing section 213. The statute does not specify that a specific standard or technology must be implemented, and it requires EPA to consider costs, lead time, and other factors in making its determination of "the greatest degree of emissions reduction achievable through the application of technology which the Administrator determines will be available." Section 213(a)(3) also indicates that EPA's regulations may apply to nonroad engine classes in the aggregate, and need not apply to each nonroad engine individually. Finally, EPA believes the ABT program is consistent with the statutory requirements of the Clean Air Act.

The ABT program being finalized with today's action is similar in many ways to the program proposed for nonhandheld engines. Changes to the proposed program have been made

in response to comments received on the proposal and the revised standards for Class I engines. The following discussion summarizes the main provisions of the ABT program being finalized and explains the main differences from the proposed ABT program.

As noted above, the ABT program will apply to Phase 2 small SI nonhandheld engines. The ABT program will be available for HC + NOx emissions but will not be available for CO emissions. The ABT program will also apply to natural gas-fueled engines. All credits for natural gas-fueled engines will be determined against the applicable NMHC + NOx standards. In addition, manufacturers will be allowed to freely exchange NMHC+NOx credits from engines fueled by natural gas with HC+NOx credits from engines fueled by fuels other than natural gas in the ABT program.

Cross-class exchange of ABT credits between nonhandheld engine families will not be restricted. EPA had proposed restricting using credits from Class I engines in determining compliance of Class II engines since the standard proposed for Class I engines was considerably less stringent than that proposed for Class II engines; it would have been quite easy to generate credits in Class I and use them to offset FELs above the standard for Class II engines. However, because of the tighter standards being adopted for Class I engines and the one restriction (discussed below) regarding generation of credits from Class II engines, EPA is far less concerned that credits from Class I could result in delays in technology improvement for Class II, and does not believe that any cross-class restrictions for nonhandheld engines are necessary. Therefore, all restrictions on cross-class credit exchanges for small SI nonhandheld engines have

been eliminated.

As part of the ABT program, EPA is setting upper limits on the FEL values that may be declared by manufacturers under the Phase 2 standards. (The FEL is established by the manufacturer and takes the place of the emission standard for all compliance determinations.) The proposed FEL upper limits were based on the previous set of standards (i.e., the Phase 1 standards) for nonhandheld engines after accounting for in-use deterioration, which is typically how EPA establishes such limits. Therefore, EPA is adopting HC + NOx FEL upper limits of 32.2 g/kW-hr for Class I engines and 26.8 g/kW-hr for Class II engines as proposed, even though the HC+NOx emission standard adopted for Class I engines is more stringent than originally proposed.

EPA is finalizing one limitation that applies to Class II engines only. As proposed, because of concerns over the potential to generate significant credits from existing Phase 1 engines against the Phase 2 standards, EPA is requiring that a manufacturer's production-weighted average of HC+NOx FELs for Class II engines may not exceed 13.6 g/kW-hr in model year 2005, 13.1 g/kW-hr in model year 2006, and 12.6 g/kW-hr in model years 2007 and later. This calculation is based strictly on the FELs and does not allow the manufacturer to factor in the use of credits, as is done when a manufacturer demonstrates compliance with the HC+NOx standard of 12.1 g/kW-hr. EPA believes this approach will ensure that Class II engines are converted to OHV or OHV-comparable technology in a reasonable time frame while still encouraging the early introduction of cleaner, more durable technology and ensuring that

manufacturers have the flexibility provided by an ABT program to comply with the new standards. For Class I, EPA does not have a similar concern since the standards being adopted are expected to provide only limited opportunity to generate large amounts of credits from existing engines.

All credits will be calculated based on the difference between the manufacturer-established FEL and the Phase 2 HC + NOx standard for the applicable model year using the following equation.

Credits = (Standard - FEL) x Production x Power x Useful life x Load Factor

At the time of certification, manufacturers must also supply information to EPA on the terms used in the above noted equation. "Production" represents the manufacturer's U.S. production of engines for the given engine family, excluding exported engines and engines that will be sold in California. "Power" represents the maximum modal power of the certification test engine over the certification test cycle. "Useful Life" is the regulatory useful life established by the manufacturer for the given engine family. "Load Factor" is a constant that is dependent on the test cycle over which the engine is certified.

Under the new ABT program for small SI nonhandheld engines, credits will have an unlimited credit life and will not be discounted in any manner.

The equation being adopted for credit calculation in today's action has been revised from the proposal in two ways. First, EPA proposed that manufacturers use the 49-state sales of an engine family instead of 49-state production levels. However, because of the non-integrated nature of the nonroad small SI market, EPA believes it would be very difficult for manufacturers to determine actual sales. EPA believes that production levels should provide an appropriately accurate estimate of sales. Second, EPA proposed that manufacturers use a sales-weighted average maximum modal power for all of the engine configurations within an engine family as opposed to the maximum modal power of the certification test engine. Because a large fraction of engine families include multiple configurations, EPA believes it would create unnecessary burden on engine manufacturers to determine the maximum modal power of every engine configuration. Using a consistent approach for estimating the maximum modal power based on the certification test engine simplifies the program for manufacturers. At the same time, it should not have any significant impact on the relative number of credits generated under the program from engines with FELs below the standards versus engines with FELs above the standards.

Under the new ABT program, manufacturers of small SI nonhandheld engines will be allowed to use portions of the ABT program prior to implementation of the Phase 2 standards to provide an incentive to accelerate introduction of cleaner technologies into the marketplace. The Agency believes that making bankable credits available prior to the effective date of the new standards will reward those manufacturers who take on the responsibility of complying with the Phase 2 requirements sooner than required and will result in early environmental benefits. Under

the early banking provisions for small SI engines, manufacturers will be allowed to begin using the averaging and banking portions of the ABT program beginning with the 1999 model year for engines certified to the Phase 2 requirements and produced after the effective date of this action. However, as was the case with certain provisions included in the proposal, the ability of a manufacturer to generate early credits also is being limited by the regulatory provisions being adopted today. The protocols adopted in these regulations assure that a manufacturer will only generate credits from engines cleaner than those otherwise anticipated to be available. In this way, manufacturers are rewarded for the extra effort of designing and producing lower emitting engines and the environment benefits from this extra effort. The regulatory provisions adopted today assure that the amount of credits received for the early introduction of a low emitting engine are appropriate considering both the current designs of engines and the changes in emission performance necessary to meet the Phase 2 standards as well as the degree to which the industry and consumers would benefit from the opportunity to generate early credits.

For Class I and Class II engines, manufacturers may generate early credits to be used for averaging or banking purposes from only those engine families certified with FELs at or below the final Phase 2 standard (i.e., 16.1 g/kW-hr HC+NOx for Class I engines, and 12.1 g/kW-hr HC+NOx for Class II engines (or 14.8 g/kW-hr NMHC+NOx for Class I and 11.3 g/kW-hr NMHC+NOx for Class II natural gas-fueled engines)). As proposed, all early credits for Class II engines will be calculated against the initial Phase 2 HC+NOx standard of 18.0 g/kW-hr. For Class I engines, because the Phase 2 standards initially only apply to new engine family designs produced for the first time on or after August 1, 2003, EPA will allow manufacturers to generate

early credits from any other Class I engines (i.e., those produced before August 1, 2003) if they are certified with an FEL at or below 16.1 g/kW-hr; the amount of the credit will be determined by the difference between the engine family's FEL and a HC+NOx level of 20.5 g/kW-hr. The manufacturer may continue generating early credits from such Class I engine families for as long as it continues producing the engine family until August 1, 2007 since, at that time, all Class I engines families are subject to the Phase 2 standards. The 20.5 g/kW-hr level is based on the same assumption as the initial Class II phase-in standard that half of the engines are at the Phase 1 Class I standard and the other half are at the Phase 2 Class I standard adopted today. (Any Class I engine family for which a manufacturer wishes to start generating credits for the first time after August 1, 2003, will not be eligible for early credits. Such families will be eligible to generate credits under the standard provisions of the ABT program against the Phase 2 standard of 16.1 g/kW-hr.)

All engines for which the manufacturer generates early credits must comply with all requirements for Phase 2 engines (e.g., the Production Line Testing program requirements). Manufacturers of nonhandheld engines will not be allowed to trade their early engine credits to other manufacturers until the first effective model year of the Phase 2 standards for the applicable engine class.

To be eligible for early credits for an engine family, EPA had originally proposed that a nonhandheld engine manufacturer would have to certify and comply with the initial Phase 2 standards for its entire production line in the class containing that family. EPA proposed this

requirement as a means of limiting the ability of the manufacturer to generate inappropriately large amounts of early credits. However, because EPA is adopting significantly tighter standards for Class I engines than originally proposed, the ability of the manufacturer of Class I engines to easily generate large amounts of early credits is greatly diminished. Additionally, EPA believes all current manufacturers of Class II engines would meet this requirement with their currently certified Phase 1 engines, in which case the proposed restriction would have no effect. Therefore, EPA is not adopting such a requirement in today's action.

In establishing the set of declining standards for Class II engines, EPA assumed a certain phase-in of OHV or comparably clean and durable technology during the transition years. In order to encourage manufacturers to meet the assumed phase-in schedule, EPA proposed to limit the use of credits in two situations that were dependent on whether the manufacturer met the assumed OHV phase in schedule. First, manufacturers would only be allowed to trade credits from Class II engines to Class I engines if they met the assumed phase-in schedule. Second, manufacturers would only be allowed to use early banked Class II credits beginning in 2001 or later if they met the OHV or comparably clean engine production phase-in schedule estimates for that model year. Because EPA is finalizing significantly tighter Class I standards and because EPA is adopting caps on the long term levels of FELs, EPA does not believe that the proposed limits on the use of credits which were tied to whether a manufacturer was meeting the assumed OHV technology phase in are necessary. These aspects of the final rule should eliminate EPA's concern that introduction of OHV or comparably clean engine technology could be delayed. Therefore, EPA is not finalizing the limits on the use of credits that were dependent on a

manufacturer showing compliance with the assumed OHV phase-in schedule for Class II engines.

As discussed in section II.E. of today's notice, EPA is finalizing several compliance flexibility provisions for engine manufacturers and equipment manufacturers that allow the limited use of Phase 1 engines in the Phase 2 time frame. Phase 1 engines sold by engine manufacturers under the flexibility provisions will be excluded from the ABT program. In other words, engine manufacturers will not have to use credits to certify Phase 1 engines used for the flexibility provisions even though they would likely exceed the newly adopted Phase 2 standards.

Another flexibility provision described in section II.E. of today's notice allows engine manufacturers to certify Class II side-valve engine families with annual sales of 1,000 units or less to an HC+NOx cap of 24.0 g/kW-hr starting with the 2010 model year. For such engine families, the ABT program allows manufacturers to exclude such engine families for the 2010 model year and later. As noted in section II.E., EPA is dropping the portion of the proposed flexibility for small volume Class II SV engine families for model years 2001 through 2009 that would have allowed them to meet the 24.0 g/kW-hr HC plus NOx level and be included in the ABT program (for model years 2001 through 2004) if they exceeded this level. In its place, the Agency is adopting a flexibility that allows small volume engine families to meet the Phase 1 requirements for model years 2001 through 2009. Class II SV engine families taking advantage of this flexibility during the 2001 to 2009 model years would be excluded from the ABT program.

As noted elsewhere in today's notice, EPA is adopting a number of provisions that address post-certification compliance aspects of the new standards for nonhandheld engines. In one specific case, EPA is allowing manufacturers to use credits from the certification ABT program to address excess emissions situations determined after the time of certification. As noted in the discussion on compliance, EPA does not believe that the typical type of enforcement action that could be taken when a substantial nonconformity is identified (i.e., an engine family recall order) would generally be workable for small SI engines given the nature of the market. Instead, for the purposes of implementing the PLT program, EPA is adopting provisions to allow manufacturers to use engine certification ABT credits to offset limited emission performance shortfalls for past production of engines determined through the PLT program as described in section II.D. of today's notice. Under the adopted provisions, manufacturers are allowed to use all engine credits available to them to offset such emission performance shortfalls without any cross-class restrictions.

EPA is not allowing manufacturers to automatically use ABT credits to remedy a past production nonconformance situation in the Selective Enforcement Audit (SEA) program. As described in today's action, EPA expects to primarily rely on the PLT program to monitor the emissions performance of production engines. However, EPA expects that SEAs may be conducted in certain cases. Therefore, as discussed in section II.D., if EPA determines that an engine family is not complying with the standards as the result of an SEA, EPA plans to work with the manufacturer on a case-by-case basis to determine an appropriate method for dealing with the nonconformity. The option(s) agreed upon by EPA and the engine manufacturer may, or

may not, include the use of ABT credits to make up for any "lost" emission benefits uncovered by the SEA.

C. Test Procedures

The test procedure being adopted for the Phase 2 nonhandheld program is the steady state procedure currently used in Phase 1, with several modifications. These test procedure modifications were proposed for the reasons contained in the proposal (63 FR at 3976-77). No adverse comment was received on these proposals. First, engines equipped with an engine speed governor must use the governor to control engine speed during the test cycle modes with the exception of Mode 1 or Mode 6. Second, the proposed test procedure for NMHC is being adopted. This test procedure will allow proper measurement of methane emissions from spark-ignition engines and permit appropriate determination of the NMHC emission for natural gas-fueled engines. Additionally, several cycle operational modifications have also been adopted as recommended by EMA (see section 4 of the Summary and Analysis of Comments).

Finally, one comment was received in regards to special test procedures accepted by EPA during the Phase 1 rulemaking and their continued use into Phase 2. EPA will continue to accept special test procedures during Phase 2 (including those approved under Phase 1) as long as they continue to result in emission compliance determinations expected to be equivalent to those resulting from use of the Phase 2 test procedures. Under this approach, manufacturers who test their engines using fuel satisfying California's requirements are allowed, as under Phase 1 rules,

to adjust their test results in a manner which EPA determines would yield the same emission levels had the engines been tested using the test fuels meeting the specifications in the federal regulations.

D. Compliance Program

The compliance program being adopted today for Phase 2 nonhandheld engines is comprised of three parts: a pre-production certification program during which the manufacturer evaluates the expected emission performance of the engine design including the durability of that emission performance; an assembly line test program which samples product coming off the assembly line to assure the design as certified continues to have acceptable emission performance when put into mass production; and a voluntary in-use test program during which participating manufacturers evaluate the in-use emission performance of their product under typical operating conditions. Standards have been set for each class. The manufacturer divides its product offering based upon specific design criteria which have a potential for significantly different emission performance; these subdivisions are called engine families. Each engine family is required to meet the standard applicable for the class in which that engine resides unless the manufacturer chooses to participate in the ABT program also being adopted today.

The ABT program has already been described (see section II.B. for discussion of the ABT program). The other provisions of the compliance program are explained in more detail below. In all cases, to the best of EPA's knowledge, the requirements of this federal compliance

program are sufficiently similar to the requirements of the California Air Resources Board program for these engines such that for engine families sold in both the State of California and federally, the engines selected for testing, the test procedures under which they are tested and the data and other information required to be supplied by regulations will be the same under both programs. Thus, we expect that a manufacturer will compile one application for certification satisfying the information needs of both programs and thus saving the manufacturer time and expense. Similarly, the EPA and California compliance programs are expected to share information such that any production line testing or in-use testing conducted for one program will satisfy the similar needs of the other program, again minimizing the burden on the manufacturers.

1. Certification

This section addresses the certification program finalized today for nonhandheld engine manufacturers. The proposed rule discussed the certification program at 63 FR 3981. Several comments were submitted in response to the proposal. EPA addresses these comments and provides detailed explanations of why the Agency retained provisions as proposed or changed the proposed provisions in the Summary and Analysis of Comments document at section 5. The certification process as required in the Act is an annual process and requires that manufacturers demonstrate that regulated engines will meet appropriate standards throughout their useful lives. The Act prohibits the sale, importation or introduction into commerce of regulated engines when not covered by a certificate.

The proposal would have required nonhandheld engine manufacturers to estimate the in-use deterioration of their engine families by different methods depending on the type of engine technology (see 63 FR 3981). For manufacturers of nonhandheld side valve (SV) engines or engines with aftertreatment (i.e., catalysts), the proposal would have required that one engine from each engine family be either field aged or bench aged to its full useful life to demonstrate compliance. If a manufacturer were to choose the bench aging option, the emission results would have had to be adjusted using the field/bench adjustment program. The field/bench adjustment program was described in the proposal at 63 FR 3977. These results, either the field aged or adjusted bench aged, would have been used to calculate a deterioration factor which would then be applied to the results of testing done on new engines in the certification, PLT or SEA programs. For manufacturers of nonhandheld engines with overhead valve technology, the proposal would have allowed manufacturers to use an industry-wide assigned deterioration factor for certification. Manufacturers of overhead valve nonhandheld engines would have also been allowed under the proposal to establish their own deterioration factors by field aging a minimum of three engines per family to their full useful lives, provided they established deterioration factors for all of their engine families within a useful life category. Manufacturers of overhead valve engines would have been required to participate in an industry-wide Field Durability and In-use Performance Demonstration Program. This program is described in the proposal at 63 FR 3989 and its primary purpose was to verify whether the industry-wide assigned deterioration factors were appropriate.

EPA received a significant number of comments regarding the complexity of the proposed certification program, the inappropriateness of an assigned deterioration factor for all useful life categories for nonhandheld engines with overhead valve technology, the prohibitive expense of field aging engines, and the advantages of harmonizing EPA's final certification program with that of the California Air Resources Board. EPA now believes the complexity of the proposed program would make it difficult to manage and organize the certification program for both industry and the Agency. EPA also believes that harmonizing its programs with the California Air Resources Board will allow the industry to more efficiently comply with the final emission standards and requirements. Additionally, EPA is concerned the field/bench adjustment program may not be statistically reliable enough to establish appropriate deterioration factors (in an effort to control the cost of this program, only a minimum amount of data was proposed to be required; this small amount of data hurts the statistical reliability of any resulting decision).

Based on comments received and EPA's further evaluation of the proposed certification program, EPA is finalizing the certification program with the following significant changes to the proposal. These changes, and other less significant changes, are also discussed in the Summary and Analysis of Comments document. In today's final rule, EPA is adopting a significantly less complex certification program that harmonizes with the certification program adopted by the California Air Resources Board as part of its Tier 2 regulations. In this program, manufacturers of nonhandheld engines of all technologies are required to demonstrate that their regulated engines comply with appropriate emission standards throughout the engines' useful lives. To

account for emission deterioration over time, manufacturers must establish deterioration factors for each regulated pollutant for each engine family. The final rule allows manufacturers to establish deterioration factors by using bench aging procedures which appropriately predict the in-use emission deterioration expected over the useful life of an engine or an in-use evaluation which directly accounts for this deterioration. As is the case with many EPA mobile source regulations, multiplicative deterioration factors may not be less than one. Additionally, where appropriate and with suitable justification, deterioration factors may be carried over from one model year to another and from one engine family to another.

Today's final rule also provides flexibility for small volume engine manufacturers and small volume engine families, allowing manufacturers to optionally use assigned deterioration factors established by the Agency. The deterioration factors, either assigned or generated, are used to determine whether an engine family complies with each emission standard in the certification program, the production line testing program, and the Selective Enforcement Auditing program.

As in Phase 1, manufacturers can submit certification applications to the Agency electronically, either on a computer disk or through electronic mail, making the certification application process efficient for both manufacturers and the Agency. Also, EPA and the California Air Resources Board will have a common application format allowing manufacturers to more easily apply for certification.

2. Production Line Testing - Cumulative Summation Procedure

This section addresses the production line testing (PLT) program finalized today for nonhandheld engine manufacturers. The proposed rule discussed the PLT program at 63 FR 3984-89. Several comments were submitted in response to the proposal. EPA addresses these comments and provides detailed explanations of why the Agency retained provisions as proposed or changed the proposed provisions in the Summary and Analysis of Comments document at section 5. The PLT program adopted in today's rule requires manufacturers to conduct manufacturer-run testing programs using the Cumulative Summation Procedure (CumSum).[3] EPA is finalizing the program as proposed with the following significant modifications. These changes, and other less significant changes, are also discussed in the Summary and Analysis document. The proposal would have required manufacturers of handheld engine families to participate in the PLT program while allowing nonhandheld manufacturers the option of participating in the PLT program or electing to remain eligible for traditional Selective Enforcement Audits. EPA received comments both in favor of finalizing this option for nonhandheld manufacturers and removing this option and requiring all manufacturers, handheld and nonhandheld, to participate in the PLT program. Because the SEA program can only provide a single snapshot of a manufacturer's production, while the PLT program has the ability to evaluate a manufacturer's production throughout the model year, EPA believes that the PLT

[3]The CumSum procedure has been promulgated for marine engines in EPA's spark-ignition marine rule at 40 CFR Part 91 (61 FR 52088, October 4, 1996). In this section, "PLT" refers to the manufacturer-run CumSum procedure. "PLT" does not include Selective Enforcement Auditing (SEA), which is addressed separately in Section II.D.3 of this preamble.

program provides a better evaluation of a manufacturer's production than the SEA program. Further, the PLT program does not disrupt a manufacturer's normal day to day activities. Therefore, the proposed option for nonhandheld manufacturers to elect to continue to rely on Selective Enforcement Audits is not being finalized, and nonhandheld manufacturers are required to conduct PLT programs using the CumSum approach in today's final rule.

The PLT proposal also included an opportunity for the Agency to approve alternative methods to the CumSum approach if those alternative methods met certain statistical criteria, including: the alternative methods produce substantially the same levels of producer and consumer risk as CumSum, provide for continuous sampling, and include an appropriate decision mechanism for determining noncompliance. EPA received comments in support of the proposal to allow manufacturers to submit alternative test schemes for PLT, but also suggesting that the above criteria were too restrictive and would result in a program so closely aligned with CumSum that, by implication, the manufacturer would have no reason to pursue the alternative. Therefore, these commenters recommended EPA should either make the criteria less restrictive, or remove the specific criteria altogether. EPA believes that the proposed criteria would be crucial to developing any alternative production line testing program, and that the Agency could not approve an alternative program with less restrictive criteria. EPA also believes the CumSum procedure is an accurate and appropriate production line testing program for those manufacturers covered by the production line testing requirements. Therefore, in response to industry comments suggesting that there would be little utility in being able to seek approval of alternate methods under EPA's proposed criteria, EPA is not adopting the proposed option that would

have allowed manufacturers to apply for alternative PLT methods.

The CumSum program, as finalized, requires manufacturers to conduct testing on each of their engine families (except where relieved of this requirement under provisions granting small volume flexibility). The maximum sample size that could be required for each engine family is 30 engines or 1 percent of a family's projected production, and the number of tests ultimately required is determined by the results of the testing. EPA and the California ARB have harmonized their PLT programs and both will require manufacturers to use the CumSum procedure for testing production engines. Manufacturers will be able to submit PLT reports to the Agency electronically, either on a computer disk or through electronic mail, which will save both the industry and EPA time and money.

As mentioned in the discussion on ABT, above, manufacturers may, for a limited amount of production, use ABT credits to offset the estimated excess emission of previously produced noncomplying engine designs as determined in the PLT program. For future production, the manufacturer would be expected to correct the noncompliance problem causing the emission noncompliance either by changing the production process, changing the design (which would require recertification) or raising the FEL to compensate for the higher emissions (also requiring recertification). In the event a manufacturer raises an FEL as a result of a PLT failure, it may do so for future production as well as past production. EPA expects few instances in which the manufacturer will correct a PLT failure through raising the FEL since that would imply the manufacturer incorrectly set the initial FEL levels for that family; frequent use of this remedy

would suggest the manufacturer was incapable of correctly setting the FELs for its product, in which case EPA would have to reconsider allowing a manufacturer to participate in the ABT program at its option. It should also be noted that, as proposed, compliance with the standards will be required of every covered engine. Thus, every engine that failed a PLT rest would be considered in noncompliance with the standards and must be brought into compliance. EPA's rules allowing the use of the average of tests to determine compliance with the PLT program is intended only as a tool to decide when it is appropriate to suspend or revoke the certificate of conformity for that engine family, and is not meant to imply that not all engines have to comply with the standards or applicable FEL.

Under the flexibilities section, we also note that small volume manufacturers and small volume engine families need not be included in the PLT program at the manufacturer's option. Finally, EPA proposed that exceptionally low emitting engines could also be exempted from PLT testing at the manufacturer's option, however, they would also not be able to generate ABT credits. Manufacturers have indicated that they would much rather have the credits available from a low emitting engine design than the alternative of reduced PLT testing. Therefore, this proposed option has not been adopted.

3. Selective Enforcement Auditing

The proposal discussed Selective Enforcement Auditing (SEA) at 63 FR 3987-88. The SEA program is not the Agency's preferred production line testing program for small

nonhandheld engines, and the CumSum approach is being finalized as the PLT program that manufacturers will conduct. Specific comments submitted regarding SEA, and EPA's responses, are discussed in the Summary and Analysis of Comments document at section 5. The SEA program is included in today's final rule as a "backstop" to the CumSum program and would be used in cases where there is evidence of improper testing or of a nonconformity that is not being addressed by the CumSum program. The SEA program, as finalized, will also apply to engine families optionally certified to the small volume manufacturer provisions and the small volume engine family provisions, in cases where manufacturers elect not to conduct PLT testing for such families. However, as for other families, EPA does not expect families certified under the small volume provisions will be routinely tested through an SEA program.

In contrast to the PLT program, manufacturers who fail an SEA will not have the automatic option of using ABT credits to remedy noncomplying engines already introduced into commerce. The PLT program was designed to allow a manufacturer to continually evaluate its entire production and quickly respond to the results throughout the model year. EPA believes that allowing a manufacturer to use credits, for a limited amount of engines, to remedy past production emission failures is consistent with the continual evaluation provided by the PLT program. The SEA program, in contrast, is designed to be a one time, unannounced inspection of a manufacturer's production line with definitive passing or failing results. EPA believes that is this type of a compliance program, where at most only a few engine families might be tested each year, manufacturers must place more emphasis on the transition from certification to the production line and must set initial FELs accurately. To encourage accurate FEL settings at the

time of certification, the SEA program does not allow manufacturers to automatically remedy SEA failures by retroactively adjusting FELs. Remedies for the SEA failure are best determined on a case-by-case basis which might include the use of ABT credits if agreeable to both EPA and the manufacturers.

4. Voluntary In-Use Testing

This section addresses the voluntary in-use testing program finalized today for nonhandheld engine manufacturers. The proposed rule discussed the in-use testing program at 63 FR 3989. Several comments were submitted in response to the proposal. EPA addresses these comments and provides detailed explanations of why the Agency retained provisions as proposed or changed the proposed provisions in the Summary and Analysis of Comments document at section 5. The proposal would have required manufacturers of nonhandheld engines manufactured with overhead valve technology to conduct up to a total of 24 emissions tests on engines that were field aged to their full useful lives. The primary function of these in-use tests was to verify that the industry-wide deterioration factors predicted for the overhead valve engines were appropriate. Based on industry comments regarding the prohibitive expense of conducting field aged in-use tests, EPA is not adopting the proposed in-use programs in today's rule.

However, EPA still desires meaningful in-use data so that it can more appropriately assess the actual emissions inventory of this industry. Therefore, EPA is adopting a voluntary in-use testing program. The voluntary in-use testing program gives nonhandheld engine

manufacturers the option of using a portion of their PLT resources to generate field aged emissions data. At the start of each model year, manufacturers may elect to place up to 20 percent of their engine families in this voluntary program. For those families in this program, manufacturers would not be required to conduct PLT for two model years, the current year and the subsequent year (the California Air Resources Board has indicated that they would also exempt families in this in-use testing program from their PLT requirements**)**. Instead, manufacturers would place a minimum of three randomly selected production engines in existing consumer owned, independently owned, or manufacturer owned fleets. Manufacturers would install the engines in equipment that represents at least 50 percent of the production for an engine family and age the engine/equipment combination in actual field conditions to at least 75 percent of each engine's useful life. Once an engine in this program has been sufficiently field aged, the manufacturer would conduct an emissions test on that engine. Manufacturers would have three calendar years from the date they notified the Agency of their intent to include a family in the program to complete testing.

While this compliance program will not require the manufacturer to conduct any in-use testing to verify continued satisfactory emission performance in the hands of typical consumers, an optional program for such in-use testing is being provided. EPA believes it is important for manufacturers to conduct in-use testing to assure the success of their designs and to factor back into their design and/or production process any information suggesting emission problems in the field. If any information derived from this program indicates a substantial in-use emission performance problem, EPA anticipates the manufacturer will seek to determine the nature of the

emission performance problem and what corrective actions might be appropriate. EPA will offer its assistance in analysis of the reasons for unexpectedly high in-use emission performance and what actions might be appropriate for reducing these high emissions. Whether or not a manufacturer chooses to conduct such a voluntary in-use testing program, EPA may choose to conduct its own in-use compliance program. If EPA were to determine that an in-use noncompliance investigation was appropriate, the Agency expects it would conduct its own in-use testing program, separate from this voluntary manufacturer testing program, to determine whether a specific class or category of engines is complying with applicable in-use standards.

Although EPA is not finalizing the mandatory in-use testing programs proposed, the Agency is finalizing the in-use noncompliance provisions as proposed (see 63 FR 4026: Subpart I 90.808). Under these provisions, if the Agency determines that a substantial number of engines within an engine family, although properly used and maintained, do not conform to the appropriate emission standards, the manufacturer will be required to remedy the problem and conduct a recall of the noncomplying engine family as required by CAA section 207. However, we also recognize the practical difficulty in implementing an effective recall program as it would likely be impossible to properly identify the owners of equipment using small engines (there is no national requirement to register the ownership of such equipment), and it is also highly questionable whether owners or operators of such equipment would respond to an emission-related recall notice. Therefore, under the final program EPA's intent is to allow manufacturers to nominate alternative remedial measures to address potential non-compliance situations, as the proposed rulemaking noticed discussed (see 63 FR 3992). EPA expects that, if successfully

implemented, the use of these alternatives should obviate the need for the Agency to make findings of substantial nonconformity. In evaluating these alternatives, EPA would consider those alternatives which (1) represent a new initiative that the manufacturer was not otherwise planning to perform at that time and that has a nexus to the emission problem demonstrated by the subject engine family; (2) cost substantially more than foregone compliance costs and consider the time value of the foregone compliance costs and the foregone environmental benefit of the subject family; (3) offset at least 100 percent of the exceedance of the standard or FEL; and (4) are able to be implemented effectively and expeditiously and completed in a reasonable time. These criteria would function as ground rules for evaluating projects to determine whether their nature and burden is appropriate to remedy the environmental impact of the nonconformity while providing assurance to the manufacturer that EPA would not require excessive projects.

In addition to being evaluated according to the above criteria, alternatives would be subject to a cost cap. EPA would apply a cost cap of 75 percent above and beyond the foregone costs adjusted to present value, provided the manufacturer can appropriately itemize and justify these costs. EPA believes that this is an appropriate value which is both “substantial” and sufficient to encourage manufacturers to produce emission durable engines.

Given the important role that alternative remedial measures may play, EPA intends to develop guidance regarding alternative remedial measures. EPA will seek input of the regulated industry, as well as other concerned stakeholders, in developing such guidance.

E. Flexibilities

In the NPRM, EPA proposed a number of flexibilities to ease the transition from the Phase 1 to the Phase 2 program, to ensure that the Phase 2 standards are cost-effective and achievable, and to reduce the compliance burden while maintaining the environmental benefits of the rule. Several comments were received on the flexibilities proposed, some supporting the proposals and others offering recommended changes. In addition, the need for modifications to the proposed set of flexibilities evolved out of the investigations which led to other changes to the proposal including the adoption of more stringent Class I standards than were proposed. The following is a summary of the revised flexibilities for this rulemaking.

1. Carry-Over Certification

Consistent with other mobile source emission certification programs, EPA will allow a manufacturer to use test data and other relevant information from a previous model year certification program to satisfy the same requirements for the existing model year certification program as long as the data and other information are still valid. Such "carry-over" of data and information is common in mobile source programs where the engine family being certified in the current model year is identical to the engine family previously certified.

2. Small Volume Engine Manufacturer Definition

EPA proposed a number of flexibilities for engine manufacturers defined as small volume engine manufacturers; these flexibilities are identified in section II.E.4, below. While supporting these flexibilities, EMA and OPEI, on behalf of their members, commented that revisions to the definitions of small volume equipment manufacturer and small volume engine manufacturer were appropriate to protect the interests of engine manufacturers who would or would not meet the proposed definition. Specifically, EMA and OPEI recommended eliminating the "small engine manufacturer" definition altogether, and relying instead on an expanded definition of small volume engine family to meet the goal of assuring an adequate supply of engines for niche equipment applications, especially as produced by small volume equipment manufacturers. According to EMA and OPEI, providing any additional relief to small volume engine manufacturers would put these manufacturers at an unfair competitive advantage over engine manufacturers whose production volumes were too large to qualify for this relief.

The issue of the small volume engine family definition is discussed in the subsequent section. Regarding the availability of flexibilities targeted specifically for the small volume engine manufacturers, EPA remains convinced that the relatively small technical and production resources available to the smallest engine manufacturers makes their job of complying with Phase 2 emission standards significantly more difficult than for larger manufacturers with comparably greater technical and financial resources available to apply toward solving this problem. Consequently, without some additional flexibilities under these regulations, the small volume manufacturer would be much less likely to produce engines complying with the Phase 2 regulations or, if able to make the necessary design changes, would only be able to spread the

cost of such changes over considerably fewer production engines. In such a case, not only would small volume engine manufacturers be financially stressed compared to their larger competitors, but they might need to pass along to their consumers a higher per unit price increase in an attempt to recover at least part of their cost of compliance. Higher price increases would make their product less competitive. In the extreme, either due to pricing pressures or simply due to the limitations in technical capability, without additional flexibilities, small volume engine manufacturers might not be able to continue providing engines to their customers. The engine manufacturers could go out of business and their customers could suffer from a lack of engine supply. This potential for loss in engine availability would more likely fall on the shoulders of small equipment manufacturers who provide niche products and who are the more typical customers of the small volume engine manufacturers.

EPA continues to believe flexibilities aimed at the small volume engine manufacturer are appropriate and is retaining the definition of small volume engine manufacturers as proposed. As proposed, to qualify as a small volume engine manufacturer a nonhandheld engine manufacturer may produce no more than 10,000 engines annually.

3. Small Volume Engine Family Definition

EPA proposed that manufacturers of small volume nonhandheld engine families (those families with annual production of 1000 units or less) be provided cost saving flexibilities. These flexibilities are described in section II.E.4. Without such flexibilities, the cost and other

difficulties of modifying these small volume engine families to comply with the Phase 2 standards may be difficult enough that the manufacturer might either be unable to complete the modification of the engine design in time or may choose for economic reasons to discontinue production of the small volume engine family. The impact of such a scenario would of course fall on the engine manufacturer through reduced engine sales, but would also fall perhaps even more significantly on small volume equipment applications, the most typical use for these small volume engine families. Due to the unique character of these small volume equipment applications, it is quite possible the equipment manufacturer might not be able to find a suitable replacement engine. In such case, the equipment manufacturer would also be significantly impacted through lost sales, and consumers would be harmed through the loss in availability of the equipment.

As noted in the prior section, EMA and OPEI commented that EPA should redefine the small volume family production volume limit from the 1000 unit maximum proposed for nonhandheld engine families to a level of less than 5,000 units. Tecumseh requested the addition of an option of 1 percent of a manufacturer's total production as the upper limit for determining small volume engine families.

EPA has re-examined the production limits for small volume engine families and has determined that the interests of preserving the availability of small volume families would be better served by raising the small volume engine family definition to 5,000 for nonhandheld engine families. A larger number of niche equipment applications will now be served and the

risk of loss in engine availability reduced. At the same time, the potential for adverse emission impacts remains very small. Given this provision 99 percent of nonhandheld engines will still be covered by the full compliance program and subject to the earliest practical implementation of the rule.

The recommendation by Tecumseh to base the small volume definition optionally on a varying scale equal to one percent (1 percent) of the engine manufacturer's sales volume is rejected as departing from the basis that absolute size of the family dictates whether it is a niche application. Furthermore, a small volume engine definition based on the total production volume of the manufacturer would disproportionately benefit the largest manufacturers who, in all other respects, tend to be in the best position to comply with the Phase 2 regulations.

4. Flexibilities for Small Volume Engine Families and Small Volume Engine Manufacturers

The flexibilities proposed for small volume engine manufacturers and small volume engine families received general support in comments to the NPRM. One modification to the proposed flexibilities is being adopted. To provide additional time to convert the many small volume engine families to designs complying with the Phase 2 standards and to provide additional lead time for small volume manufacturers, EPA is now adopting a provision that would allow the use of Phase 1 engines through model year 2009. Therefore, all manufacturers will have until 2010 to certify small volume nonhandheld engine families to Phase 2 requirements. Similarly, small volume engine manufacturers will have until 2010 to certify all of

their Class I and Class II engine families to Phase 2 requirements.

EPA proposed allowing small volume engine families and small volume engine manufacturers to continue producing Phase 1 engines until the last year of the phase in of the Phase 2 standard applicable to the engine's class. However, since the Class I standards being adopted today are significantly more stringent than the standards upon which this proposed flexibility was based, the number of engine families required to be modified and, especially, the degree of modification necessary has increased. This adds significantly to the technical and resource burden on the engine manufacturer. As anticipated in the proposal, EPA expects the major engine manufacturers will choose to modify their small volume engine families last as these represent niche markets. Additionally, these niche applications may represent some of the more difficult engine applications due to their unique requirements. The experience gained in designing, producing and getting in-use feedback on their larger engine family designs should be helpful in minimizing the cost and assuring the performance of the small volume engines. The design challenges for the small volume engine manufacturer have similarly increased suggesting more time to accomplish the transition to Phase 2 standards would be warranted. EPA expects manufacturers will take advantage of the extra time being adopted today to smooth the transition to Phase 2 standards by bringing the small volume engines into compliance throughout this time period. Due to the fact that the circumstances vary greatly from one manufacturer to another, it would be inappropriate to mandate a percent phase-in schedule or some other mandatory rate of phase-in for these small volume engine families and small volume manufacturers. Therefore, only a final compliance requirement of model year 2010 is being adopted. EPA has also

considered the air quality impact of this flexibility and determined that one percent of the total small engine production is likely to take advantage of this option to delay compliance with the Phase 2 standards with a negligible impact on the emission benefits expected from this rule.

The following summarizes the flexibilities available to manufacturers of small volume engine families and small volume engine manufacturers for these engines.

a. Can certify to Phase 1 standards and regulations until 2010 for eligible engine families; these engine families are excluded from ABT;

b. Can certify using assigned deterioration factors;

c. Can elect to not participate in PLT; SEA is still applicable.

Regarding the exclusion from ABT of engine families which take advantage of delaying implementation of the Phase 2 standards, this provision is being adopted to protect against a situation in which a manufacturer may choose to redesign and produce a small volume engine family with low emissions (e.g., meeting the Phase 2 standards) but still certify it under these small volume provisions and generate credits all the way up to the Phase 1 standards level. Since this flexibility is intended to provide small volume manufacturers and manufacturers of small volume engine families the flexibility to delay implementation of the Phase 2 standard if necessary, it would be inappropriate and unfair to other manufacturers to also allow them to generate extra credits even after redesigning their product.

5. Flexibilities for Small Volume Equipment Manufacturers and Small Volume Equipment

Models

EPA proposed flexibilities based upon equipment manufacturer needs aimed at assuring the continued supply under the Phase 2 regulations of engines for unique, typically small volume applications. These flexibilities included allowing the small volume equipment manufacturer to continue using Phase 1 compliant engines up until the third year after phase-in of the final Phase 2 standards for that engine class if the equipment manufacturer was unable to find a suitable Phase 2 engine before then. Second, EPA proposed to allow individual small volume equipment models to continue using Phase 1 compliant engines throughout the time period the Phase 2 regulation is in effect if no suitable Phase 2 engine was available and the equipment was in production at the time these Phase 2 rules were adopted. Finally, EPA proposed a hardship provision that would allow any equipment manufacturer for any of its applications to continue using a Phase 1 engine for up to one more year beyond the last phase-in of the final standard for that engine class if the requirement to otherwise use a Phase 2 compliant engine would cause substantial financial hardship.

In this final rule, EPA is adopting flexibilities which can be exercised by small volume equipment manufacturers. These flexibilities were supported by comments to the proposal and are adopted as proposed except that the criteria for determining whether someone is a small volume equipment manufacturer has been revised (see discussion in the following section II.E.6). Specifically, as proposed and for the reasons described in the proposal, the small volume equipment manufacturer will be allowed to use Phase 1 engines for up to three years beyond the

last phase-in year for the standard applicable to that engine class (or engine class and equipment category combination in the case of Class III and IV engines) if they demonstrate to EPA that no suitable Phase 2 engine is available. Secondly, small volume equipment models will be allowed to use Phase 1 compliant engines throughout the time the Phase 2 rule is in effect as long as that piece of equipment is in production as of the effective date of this rule and the manufacturer demonstrates to EPA that no suitable Phase 2 engine is available. Finally, EPA is adopting the hardship provision which will allow equipment manufacturers an additional year beyond the final phase-in of a standard to start using a Phase 2 compliant engine if they can demonstrate that earlier use would cause a significant financial hardship.

6. Small Volume Equipment Manufacturer Definition

EPA proposed that small volume equipment manufacturers would be defined as those whose annual production for sale in the U.S. across all models would be 2500 or fewer nonhandheld engines.

EMA and OPEI commented that the Small Business Administration definition of a small manufacturer should be used instead of the definition proposed by EPA for small volume equipment manufacturers. Under this definition, according to EMA and OPEI, equipment manufacturers who employed fewer than 500 persons would all be eligible for the small volume flexibilities. Alternatively, EMA and OPEI recommended that the small volume equipment manufacturer definition be expanded to include all equipment manufacturers using nonhandheld

engines who produce 5000 or fewer units annually.

EPA has considered the recommendations received in comments to the NPRM and analyzed the production data available to the Agency. As explained in the proposal, opting to use a definition of 500 or fewer employees as recommended by EMA and OPEI would capture a group of equipment manufacturers with a wide-range of equipment production volumes including some who produce up to 700,000 units annually. It would also include a group of equipment manufacturers with a wide range of financial capabilities, including some which have much larger revenue streams compared to those that would be covered by the proposed definition. EPA believes the impact of this rule is more closely tied to the volume of units produced by the manufacturer (for example, if the equipment needed to be modified to accommodate a Phase 2 engine, the impact would best be analyzed as a per unit impact) than to the number of persons employed by a firm. Therefore, establishing flexibilities under these emission rules should be based on the production volume of the manufacturer, not the number of employees. However, EPA agrees there would be advantages in expanding the definition of small volume equipment manufacturer to include slightly larger manufacturers who are still, compared to the rest of the industry, amongst the smallest. Therefore, EPA is adopting a small volume equipment definition of 5000 or fewer annual production for equipment using nonhandheld engines. This limit covers approximately two percent of the annual sales in each category. Providing the flexibilities outlined above in section II.E.5 allows significant relief to these smallest equipment manufacturers while at the same time assuring the vast majority of equipment uses the lowest emitting engines available.

7. Small Volume Equipment Model Definition

The small volume equipment model definition proposed would cover nonhandheld models of 500 or less annual production. As proposed, such small volume equipment models can use Phase 1 engines throughout Phase 2 if the manufacturer of these equipment models can demonstrate no Phase 2 compliant engine is available for existing models; if the equipment is "significantly modified" then this exemption ends, since during this modification design accommodations could be made to accept an engine meeting Phase 2 standards. This provision was proposed to permit unnecessary equipment redesign when the emission benefit from such a redesign would be negligible.

Comments were received from EMA and OPEI recommending raising the production limit to 5000 units for nonhandheld applications rather than the 500 annual production limit proposed. EPA's analysis of production data indicates that the 500 cutoff would exempt less than approximately one percent of annual sales from required use of Phase 2 engines but approximately 73 percent of the equipment models, thus providing substantial relief to many small volume applications without compromising the air quality benefits of this final rule. In contrast, a level such as 5000 for the cutoff of a small volume equipment model definition would benefit more equipment manufacturers (up to 87 percent of the equipment models) but at a significant air quality loss, as up to six percent of the units sold could be exempt. This is too great of an emissions penalty and therefore this option is rejected. EPA is adopting as proposed a definition of small volume equipment model as 500 or fewer units annual production for

nonhandheld equipment.

8. Hardship provision

EMA commented that manufacturers should not have to demonstrate a major impact on company solvency and that substantial negative economic impact or loss of market share should be enough in order to qualify for relief under the proposed hardship provision.

This hardship provision is intended to cover those extreme and unanticipated circumstances which, despite the equipment manufacturer's best efforts, place it in a situation where a lack of a Phase 2 complying engines will cause such great harm to the company that the ability of the company to stay in business is at stake. It is not intended to protect an equipment manufacturer against any financial harm or potential loss of market share. EPA believes the original intent of this provision is reasonable and that the proposed criteria are reasonable. Equipment manufacturers in less dire situations may benefit from the other flexibilities being adopted today. The rules in for this hardship provision are being adopted as proposed.

F. Nonregulatory Programs

EPA discussed a voluntary "green" labeling program and a voluntary fuel spillage and evaporative emission reduction program in the preamble to the NPRM. These programs are discussed in this section of the preamble. The particulate matter (PM) and hazardous air

pollutant (HAP) testing program for handheld engines discussed in the NPRM will be addressed in the upcoming SNPRM for handheld engines.

1. Voluntary "Green" Labeling Program

EPA discussed the concept of a voluntary program for labeling engines with superior emission performance as a way of providing public recognition and also allowing consumers to easily determine which engines have especially clean emission performance. EPA discussed a threshold of around 50 percent of the proposed standard (e.g., around 12.5 g/kW-hr for Class I engines) as the level below which engines would qualify for "green" labeling. EPA requested comment on all aspects of the program, as well as indication of interest on the part of consumer groups, engine and equipment manufacturers, and others in working with the Agency to develop and implement the program.

EPA received support for the voluntary "green" labeling program concept from several commenters, as well as suggestions for the design of such as program. Other commenters argued that a green labeling program is inconsistent with ABT, and still others supported a mandatory comprehensive labeling program to identify emissions levels above and below standards.

EPA remains committed to promoting clean technology, and is interested in developing a green labeling program for small SI engines in a way that does not confuse consumers or undermine environmental goals of the Phase 2 regulations. In the design of a program, it would

be necessary to review appropriate levels for a green label, given the increased stringency of Class I standards in the final program, as well as to consider the appropriate interface between a green labeling program and the ABT program that is being finalized for nonhandheld engines. EPA will continue to pursue the development of voluntary green labeling program for small SI engines as a nonregulatory program.

2. Voluntary Fuel Spillage and Evaporative Emission Reduction Program

In the preamble to the NPRM, EPA discussed interest in involving stakeholders in the design of a voluntary fuel spillage and evaporative emission reduction program specifically for the small engine industry and its customers. EPA requested comment on the proposed voluntary partnership program, and indication of interest in participating in the partnership. Comments on this concept included both disappointment that EPA has not done more in these areas, as well as a willingness on the part of several commenters to work with EPA. EPA remains committed to developing voluntary programs to address fuel spillage and evaporative emission reductions, but these programs are not part of the regulations being adopted today. At this time, EPA has not been able to determine the technical feasibility of substantially controlling fuel spillage and evaporative emissions from the small engine equipment sector and therefore has not been able to determine that a program mandating such controls would be achievable for this industry.

G. General Provisions and Recommendations

In the NPRM for the Phase 2 program, EPA discussed a number of general provisions impacting Phase 2 engines, including: model year and annual production period flexibilities, definition of handheld engines, small displacement nonhandheld engine class, liquefied petroleum gas fueled indoor power equipment, dealer responsibility, engines used in recreational equipment, engines used in rescue and emergency equipment, and replacement engines. EPA received comments on several of these issues, as well as recommendations on other general issues. These general provisions and other recommendations and issues are discussed in this section of the preamble. See Section 8 of the Summary and Analysis of Comments for additional discussion of these issues.

1. Model Year Definition and Annual Production Period Flexibilities

The final program includes the same model year definition as was in effect for Phase 1, and annual production period flexibilities which were established under Phase 1 only for Class II engines. While EPA is finalizing the model year definition in effect for the Phase 1 program for the Phase 2 program, and is also finalizing flexibilities similar to those in Phase 1 for the start-up of the Phase 2 program for Class II nonhandheld engines, EPA is also clarifying in this final rule the standards to which Class II Phase 2 engine would be subject at the start-up of the program. Under the final rule, Class II engine families are required to be certified to the Phase 2 program by September 1, 2001. In addition, engine families first certified to the Phase 2 program on or before August 31, 2001, and designated as "2001 model year" families, are required to meet the 2001 emission standards (e.g., 18.0 g/kW-hr HC+NOx). These engine families are also required

to re-certify for the 2002 model year by January 1, 2002. Engine families first certified to the Phase 2 program on or before August 31, 2001, and designated as “2002 model year” families, are required to meet the 2002 model year standards (e.g., 16.6 g/kW-hr HC+NOx).

2. Definition of Handheld Engine

EPA is finalizing the same definition for handheld engine as was in effect for Phase 1. Commenters suggested a displacement cutoff to determine which engines would meet less stringent "handheld" standards, but EPA is not adopting this suggestion. In response to comments from Honda and others, in a separate regulatory action, EPA intends to propose modifications to criteria for determining whether an engine could be classified as handheld that, if finalized, would be applicable for the remainder of Phase 1 and also apply for the Phase 2 program. The expected proposed modification would permit a manufacturer to exceed the weight limits (14 kg for generators or pumps, or 20 kg for one-person augers) in cases where the manufacturer could demonstrate that the extra weight was the result of using a four stroke engine or other technology cleaner than the otherwise currently allowed two stroke engine.

3. Small Displacement Nonhandheld Engine Class

EPA is not adopting a small displacement nonhandheld Class in today’s rule. As discussed in the preamble to the NPRM, although EPA had considered establishing a new class for the smallest nonhandheld engines, such a class and separate standards for the class were not

proposed. Rather, EPA requested comment on the need for such a class and what size engines should be included. Comments and additional information were received on this issue, some of which supported setting standards equivalent to the handheld standards for engines of the same displacement. EPA believes that the appropriate standards for these smallest nonhandheld engine classes should be considered in context with the standards adopted for similar size engines used in handheld applications. Therefore, EPA is deferring a decision on this issue and will reconsider it as part of the previously mentioned planned supplementary proposal for handheld engines.

4. Liquefied Petroleum Gas Fueled Indoor Power Equipment

As proposed, the final Phase 2 program is applicable to manufacturers of liquefied petroleum gas (LPG) fueled indoor power equipment. Comments to the NPRM on this issue included a suggestion that EPA exempt from regulation small manufacturers of propane-powered spark-ignited engines used solely for indoor applications and subject to OSHA indoor air quality standards and objections to EPA's assertion of jurisdiction over such equipment. The commenters suggested that since OSHA sets permissible exposure limits for indoor air toxins and since these particular pieces of equipment are designed solely for use indoors, EPA has neither the need nor the right to regulate such equipment. In response, however, OSHA does not set equipment emission standards; EPA has that responsibility. Additionally, the emissions from this equipment can be effectively controlled through the EPA regulations being adopted today. While many of the manufacturers of propane-powered spark-ignition engines are small volume

manufacturers, the regulations being adopted today also minimize the regulatory burden on these manufacturers.

Comments were also received requesting EPA regulations allow the testing and reporting of emission on a concentration basis rather than a mass basis. Measurement of concentration of emissions can be less expensive than mass emissions and EPA understands that at least some manufacturers of propane-powered spark-ignition engines are already using such equipment to check the performance of their engines after they have been converted to run on propane. However, while concentration measurements can give an indication of the emission performance of an engine, it is a far less adequate test than the mass-based emission test adopted with the Phase 1 rules and being continued with today's action.

Another comment came from a supplier of gasoline engines whose engines have been used in propane-powered equipment after conversion to run on this alternative fuel. This manufacturer is concerned that, even though it is not responsible for the changes made to the engine to allow use of propane, its name nevertheless remains on the engine after the conversion and it may be subject to warranty claims which result from the conversion and are therefore not the fault of the original engine manufacturer. Thus this original engine manufacturer requested EPA mandate that all companies which convert gasoline-fueled engines to run on propane be required to declare themselves engine manufacturers and satisfy the certification and other compliance responsibilities of this rule including emission warranty. Such persons or companies currently engaged in making these conversions have the option of not declaring themselves a

manufacturer or certifying if they can assure themselves and EPA that the conversions they are making do not increase the emissions of the engine[4]. However, in making these modifications, the modifier also assumes responsibility for any emission-related problems due to the modification; such emission-related problems would not be the responsibility of the original engine manufacturer. While sympathetic toward the original engine manufacturer's concern of potentially increased warranty burden, EPA is retaining the policy of allowing modifications to certified engines so long as the modifier has good reason to believe such modifications do not increase emissions. Under such a policy, no emission increase should occur. Requiring the modifier to re-certify, in this case, would have no expected emission benefit but would add greatly to the burden on the modifier.

5. Dealer Responsibility

The preamble to the proposed Phase 2 program clarified that the Phase 2 program adds no additional responsibilities for dealers. As in the NPRM, the final rule contains no new constraints or responsibilities for dealers and repair facilities beyond those contained in the Phase 1 rule.

6. Engines Used in Recreational Vehicles and Applicability of the Small SI Regulations to

[4]See EPA publications "Mobile Source Enforcement Memorandum No. 1A" (6-25-74); "Addendum to Mobile Source Enforcement Memorandum 1A" (9-4-97); and, "Revision to Addendum to Mobile Source Enforcement Memorandum 1A" (6-1-98), docket A-96-55, items IV-B-02, IV-B-03 and IV-B-04 respectively.

Model Airplanes

EPA is not adopting any revisions to the provisions relating to engines used in recreational vehicles established in the Phase 1 program. No revisions were proposed by the Phase 2 NPRM. EPA does intend to address recreational vehicle issues in a separate regulatory action. This separate rulemaking will address the applicability of the small SI regulations to engines used in model airplane applications, and EPA expects to propose to consider engines that serve "only to propel a flying vehicle... through air" to be recreational engines provided they also meet the other existing criteria that apply to that term. As "recreational" engines they would be effectively excluded from the small SI program.

7. Engines Used in Rescue and Emergency Equipment

EPA is finalizing the provision, as proposed, that for the remainder of Phase 1 as well as for Phase 2, exempts engines which are used exclusively in emergency and rescue equipment from compliance with any standards if the equipment manufacturer can demonstrate that no certified engine is available to power the equipment as safely and practically. No comments were received on this proposal.

8. Replacement Engines

EPA proposed to continue replacement engine provisions from the August 7, 1997

rulemaking (62 FR 42638), which amended the Phase 1 rule to allow engine manufacturers to sell uncertified engines from replacement purposes subject to certain controls designed to prevent abuse. In addition, the Phase 2 proposal contained additional safeguards and reporting and record keeping requirements to further ensure against abuse.

The final Phase 2 program for replacement engines goes beyond the August 7, 1997 rule in one area. It includes the amendment which permits uncontrolled engines to be sold for pre-regulatory equipment, and Phase 1 engines to be sold for equipment built with Phase 1 engines, subject to the above constraints (90.1003(b)(5)(iv)). The final rule does not include other provisions from the Phase 2 proposal that were added to the August 7, 1997 rule. Based on comments from manufacturers, and an assessment that eliminating these provisions will result in no loss of environmental benefits, EPA has decided to eliminate these other requirements in interest of reducing the record keeping and reporting burden on manufacturers. Note that EPA intends to propose minor modifications to the replacement engine regulations in a separate regulatory action in order to clarify the responsibilities of importers.

9. Record keeping and Information Requirements

The ICRs have been revised for final rule and estimate the average annual public reporting burden for the collection of information required under the rule for a typical engine manufacturer (see section V.C. of preamble). In addition, EPA has significantly streamlined the compliance program requirements for final rule.

10. Engine Labeling

EPA proposed two alternatives for engine labeling. These alternatives differed only in the treatment of useful life hours. As indicated in the preamble to the NPRM, EPA believes inclusion of the number of hours of emission compliance for which the engine is properly certified would provide an important tool to consumers in making their purchase decisions between competing engines. EPA anticipates manufacturers will use the useful life hours of the engine as a marketing tool. For example a manufacturer might advertise that an engine family is certified as emissions durable to 1000 hours. Thus, inclusion of meaningful useful life hours would have the potential of providing a market place mechanism regarding manufacturers who design engines for longer useful life periods.

The two alternatives for designating useful life on the engine label were to (1) simply state the useful life hours or (2) use a designator of useful life hours, for example, A, B, or C, and then adding words on the label to direct the consumer to the owner's label for an explanation of the meaning of A, B and C. This latter option was proposed only for nonhandheld engines and was based on the concern expressed by nonhandheld engine manufacturers during the development of the Statement of Principles for these engines that consumers could be confused by the meaning of the useful life period if the specific number of hours was included on the label. However, as indicated in the preamble to the NPRM, EPA was concerned that an "A, B, C" designation may not provide the same useful information to the consumer as directly including

the useful hours on the label and specifically requested comment on this issue.

In their comments on the proposal, EMA and OPEI indicated they remained concerned that consumers might believe the emissions compliance period could mean something else, for example, the expected life for which the engine would provide satisfactory product performance to the consumer. EMA and OPEI indicated "(c)onsumer purchasers are not sophisticated enough to understand the difference between the EPA term of art "useful life" and the expected time of ownership of their newly purchased lawnmower. Nor will they understand the difference between emission performance and product performance." Therefore, they recommended adopting an option whereby the engine manufacturer could indicate A, B, or C on its required engine label, make reference to the owner's manual for additional explanation and explain in the owner's manual the meaning of A, B, and C where it would be easier to provide an adequate explanation of the meaning behind an emission performance period. In contrast, the North American Equipment Dealers Association (NAEDA) commented that a buyer would not know the meaning of useful life designations such as A, B, or C prior to the purchase of the equipment since the explanation of these designations would only appear in the owner's manual which is not normally accessible to the consumer prior to purchase. Also, Honda commented specifically that engine labeling requirements should be harmonized between California and federal rules to allow an engine to be labeled for different standards and different classes. This recommendation from Honda aligns with numerous other general comments on the importance of harmonization between California and federal rules.

EPA remains concerned that an "A, B, C" designation of useful life may not be as informative of the expected emission performance period as a direct listing of the certified hours. Especially in light of NAEDA's comment, EPA is concerned about the ability of consumers to use such designations to make informed purchase decisions if their only source of explanation is the owner's manual. However, it is also not clear that including the hours listing directly on the label is the optimum alternative since, as suggested by EMA and OPEI comments, consumers may not fully understand the meaning of the emissions performance useful life hours listing and could instead, for example, believe the hours refer to perhaps a parts warranty period for the equipment in which the engine is installed. EPA is also aware of labeling options being considered by California that would allow removing the actual hours of operation from the engine label and including additional information on the product, perhaps not permanently affixed to the engine, which would satisfy the need to properly inform consumers. Allowing such labeling would also serve the goal of harmonization as supported by Honda.

Therefore, EPA is finalizing regulations which, as proposed, allow the manufacturer to use an engine label which includes the actual emissions period useful life as certified by the engine manufacturer or a label which includes an "A, B or C" designation and refers to the owners manual for further information. Based on conversations with both EMA and OPEI representatives, EPA also expects to work in partnership with the industry in developing consumer outreach material to better inform consumers of the emission improvements available through purchase of equipment using Phase 2 engines. EPA expects such outreach material will better serve the informational needs of consumers than the just relying on either of these labeling

options. Additionally, the rules allow other labeling options which the Administrator determines satisfies the information intent of the label. This option is intended to allow for the nationwide use of the California labeling system. In evaluating the adequacy of an alternative label, EPA would consider the extent to which the manufacturer's alternative engine label combined with other readily accessible consumer information adequately informs the consumer of the emission performance of the engine.

11. Emission Warranty

As proposed, EPA is not adopting revisions to the base emission performance warranty period of two years of engine use from the date of sale for this nonhandheld program. EPA will address comments from handheld manufacturers that relate specifically to whether additional flexibility is needed for some handheld products in the supplemental proposal for the Phase 2 handheld program. In addition, EPA is not adopting the proposed separate Phase 1 and Phase 2 provisions which would have required differing warranty statements. The final provisions specifying what manufacturers must warrant, therefore, remains unchanged from the existing rule.

11. Other Issues

A number of other of issues were considered in the development of this final rule, based on comments received on the proposal. These include defect reporting requirements, aftermarket

provisions, closed crankcase provisions and exclusion from HC+NOx standards for engines used exclusively in the wintertime, CO adjustments for open crankcase breathers, NOx converter placement during testing, usage meters, and metric units. Comments received on these issues, and EPA's response to those comments, can be found in Section 8 of the Summary and Analysis of Comments document.

III. Projected Impacts

A. Environmental Benefit Assessment

National Ambient Air Quality Standards (NAAQS) have been set for criteria pollutants which adversely affect human health, vegetation, materials and visibility. Concentrations of ozone (O_3) are impacted by HC and NOx emissions. Ambient concentrations of CO are, of course, impacted by CO emissions. EPA believes that the standards set in this rule would reduce emissions of HC and NOx and help most areas of the nation in their progress towards compliance with the NAAQS for ozone. The following provides a summary of the roles of HC and NOx in ozone formation, the estimated emissions impact of this rule, and the health and welfare effects of ozone, CO, hazardous air pollutants, and particulate matter. Much of the evaluation of the health and environmental effects related to HC, NOx and CO found in this section is also discussed in the Regulatory Impact Analysis (RIA).

1. Roles of HC and NOx in Ozone Formation

Both HC and NOx contribute to the formation of tropospheric ozone through a complex series of reactions. In a 1991 report, researchers emphasize that both HC and NOx controls are needed in most areas of the United States.[5] EPA's primary reason for controlling emissions from small SI nonhandheld engines is the role of their HC emissions in forming ozone. Of the major air pollutants for which NAAQS have been designated under the CAA, the most widespread problem continues to be ozone, which is the most prevalent photochemical oxidant and an important component of smog. The primary ozone NAAQS represents the maximum level considered protective of public health by the EPA. Ozone is a product of the atmospheric chemical reactions involving oxides of nitrogen and volatile organic compounds. These reactions occur as atmospheric oxygen and sunlight interact with hydrocarbons and oxides of nitrogen from both mobile and stationary sources.

A critical part of this problem is the formation of ozone both in and downwind of large urban areas. Under certain weather conditions, the combination of NOx and HC has resulted in urban and rural areas exceeding the national ambient ozone standard by as much as a factor of three. Thus it is important to control HC over wider regional areas if these areas are to come into compliance with the ozone NAAQS.

2. Health and Welfare Effects of Tropospheric Ozone

[5]National Research Council, Rethinking the Ozone Problem in Urban and Regional Air Pollution, National Academy Press, 1991.

Ozone is a powerful oxidant causing lung damage and reduced respiratory function after relatively short periods of exposure (approximately one hour). The oxidizing effect of ozone can irritate the nose, mouth, and throat causing coughing, choking, and eye irritation. In addition, ozone can also impair lung function and subsequently reduce the respiratory system's resistance to disease, including bronchial infections such as pneumonia.

Elevated ozone levels can also cause aggravation of pre-existing respiratory conditions such as asthma.[6] Ozone can cause a reduction in performance during exercise even in healthy persons. In addition, ozone can also cause alterations in pulmonary and extra pulmonary (nervous system, blood, liver, endocrine) function.

The newly revised primary NAAQS[7] for ozone based on an 8-hour standard of 0.08 parts per million (ppm) is set at a level that, with an adequate margin of safety, is protective of public health. EPA also believes attainment of the new primary standard will substantially protect vegetation. Ozone effects on vegetation include reduction in agricultural and commercial forest yields, reduced growth and decreased survivability of tree seedlings, increased tree and plant susceptibility to disease, pests, and other environmental stresses, and potential long-term effects on forests and ecosystems.

---

[6]United States Environmental Protection Agency, *Review of the National Ambient Air Quality Standards for Ozone - Assessment of Scientific and Technical Information: OAQPS Staff Paper*, EPA-450/2-92-001, June 1989, pp. VI-11 to 13.

[7]See 62 FR 38896, Friday, July 18, 1997.

High levels of ozone have been recorded even in relatively remote areas, since ozone and its precursors can travel hundreds of miles and persist for several days in the lower atmosphere. Ozone damage to plants, including both natural forest ecosystems and crops, occurs at ozone levels between 0.06 and 0.12 ppm.[8] Repeated exposure to ozone levels above 0.04 ppm can cause reductions in the yields of some crops above ten percent.[9] While strains of some crops are relatively resistant to ozone, many crops experience a loss in yield of 30 percent at ozone concentrations below the pre-revised primary NAAQS.[10] The value of crops lost to ozone damage, while difficult to estimate precisely, is on the order of $2 billion per year in the United States.[11] The effect of ozone on complex ecosystems such as forests is even more difficult to quantify. However, there is evidence that some forest types are negatively affected by ambient levels of ozone.[12] Specifically, in the San Bernadino Mountains of southern California, ozone is believed to be the agent responsible for the slow decline and death of ponderosa pine trees in these forests since 1962.[13]

Finally, by trapping energy radiated from the earth, tropospheric ozone may contribute to heating of the earth's surface, thereby contributing to global warming (that is, the greenhouse

---

[8]U.S. EPA, Review of NAAQS for Ozone, p. X-10.

[9]U.S. EPA, Review of NAAQS for Ozone, p. X-10.

[10]See 62 FR 38856, Friday, July 18, 1997.

[11]U.S. EPA, Review of NAAQS for Ozone, p. X-22.

[12]U.S. EPA, Review of NAAQS for Ozone, p. X-27.

[13]U.S. EPA, Review of NAAQS for Ozone, p. X-29.

effect),[14] although tropospheric ozone is also known to reduce levels of UVB radiation reaching the earth's surface, the increase of which is expected to result from depletion of stratospheric ozone.[15]

3. Estimated Emissions Impact of the Final Regulation

The emission standards set by today's action should reduce average in-use exhaust HC+NOx emissions from small SI nonhandheld engines approximately 59 percent beyond Phase 1 standards for nonhandheld engines by year 2027, by which time a complete fleet turnover is realized. This translates into an annual nationwide reduction of roughly 395,000 tons of exhaust HC+NOx in year 2027 over that expected from Phase 1. Reductions in CO beyond Phase 1 levels, due to improved technology, are also to be expected by year 2027.

Along with the control of all hydrocarbons, these standards should be effective in reducing emissions of those hydrocarbons considered to be hazardous air pollutants (HAPs), including benzene and 1,3-butadiene. However, the magnitude of reduction would depend on whether the control technology reduces the individual HAPs in the same proportion as total hydrocarbons.

These emission reduction estimates are based on in-use population projections using

[14]NRC, Rethinking the Ozone Problem, p. 22.

[15]The New York Times, September 15, 1992, p. C4.

growth estimates, engine attrition (scrappage), activity indicators and new and in-use engine emission factors. Data on activity indicators were based on the Phase 1 small SI regulation. Estimates of engine populations were based on population data available from the PSR databases[16] and data provided by Engine and Equipment manufacturers and on a study done for the California Air Resources Board by Booz Allen & Hamilton (BAH). Population projections into the future are based on a linear growth assumption. Attrition rates (based on the probability that an engine remains in service into a specific calendar year) for all engines included in this analysis are developed on the assumption that the equipment attrition function may be represented by a cumulative Normal distribution function. The in-use emission factor is based on a multiplicative deterioration factor which is a function of the square root of hours of equipment usage.

For the analysis summarized in Table 4, emission inventories were developed using EPA's NONROAD Model for the two regulated nonhandheld engine classes as well as for all pieces of equipment using engines covered by this rule. The total annual nationwide HC, NOx and CO emissions from small SI nonhandheld engines included in this rule were estimated for both the baseline (that is, with Phase 1 controls applied) and controlled (Phase 2) scenarios.

For the controlled scenario, EPA assumed all nonhandheld engines would be converted to overhead valve technology. As for deterioration factors, they were determined in some cases

[16]Power Systems Research, Engine Data and Parts Link data bases, St. Paul, Minnesota, 1992.

using manufacturer-supplied confidential in-use emission data and for others EPA depended on relevant information from EPA's certification data base.

Table 4: Projected Annual Nationwide Exhaust HC+NOx Emissions (tons/year)				
Year	Without Proposed Controls (Phase 1)	With Proposed Controls	Tons Reduced from Phase 1 Baseline	Percentage Reduction
2000	427,063	427,063	-----	-----
2005	453,129	347,065	106,064	23.4
2010	499,648	242,370	257,278	51.5
2015	547,514	226,571	320,943	58.6
2020	596,343	243,118	353,225	59.2
2025	651,818	269,871	381,947	59.3

4. Health and Welfare Effects of CO Emissions

Carbon monoxide (CO) is a colorless, odorless gas which can be emitted or otherwise enters into ambient air as a result of both natural processes and human activity. Although CO exists as a trace element in the troposphere, much of human exposure resulting in elevated levels of carboxyhemoglobin (COHb) in the blood is due to incomplete fossil fuel combustion, as occurs in small SI engines.

The concentration and direct health effect of CO exposure are especially important in small SI nonhandheld engines because the operator of a small SI engine application is typically near the equipment as it functions. In some applications, the operator must be adjacent to the

exhaust outlet and is in the direct path of the exhaust as it leaves the engine. According to numbers published in the Nonroad Engine and Vehicle Emission Study (NEVES), a 4-stroke, 2.9 kW lawnmower engine emits 1051.1 g/hr CO.

The toxicity of CO effects on blood and tissues, and how these effects manifest themselves as organ function changes, have also been topics of substantial research efforts. Such studies provided information for establishing the National Ambient Air Quality Standard for CO. The current primary and secondary NAAQS for CO are 9 parts per million for the one-hour average and 35 parts per million for the eight-hour average.

5. Health and Welfare Effects of Hazardous Air Pollutant Emissions

The focus of today's action is reduction of HC emissions as part of the solution to the ozone nonattainment problem. However, direct health effects are also a reason for concern due to direct human exposure to emissions from small SI nonhandheld engines during operation of equipment using such engines. Of specific concern is the emission of hazardous air pollutants (HAPs). In some applications, the operator must be adjacent to the exhaust outlet and is in the direct path of the exhaust as it leaves the engine. Today's regulatory action should be effective in reducing HAPs such as benzene and 1,3-butadiene, in so far as these are components of the HC emissions being reduced by the Phase 2 standards.

Benzene is a clear, colorless, aromatic hydrocarbon which is both volatile and flammable.

Benzene is present in both exhaust and evaporative emissions. Health effects caused by benzene emissions differ based on concentration and duration of exposure. The International Agency for Research on Cancer (IARC), classified benzene as a Group I carcinogen., namely an agent carcinogenic to humans. Occupational studies continue to provide the bulk of evidence of benzene's carcinogenicity. Workers are exposed at much higher levels than is the general public. Human epidemiologic studies of highly exposed occupational cohorts have demonstrated that exposure to benzene can cause acute nonlymphocytic leukemia and other blood disorders, that is, preleukemia and aplastic anemia. Additionally, changes in blood and bone marrow consistent with hematotoxicity are recognized in humans and experimental animals. Benzene has also been linked with genetic changes in humans and animals.

1,3-butadiene is a colorless, flammable gas at room temperature. This suspected human carcinogen is insoluble in water and its two conjugated double bonds make it highly reactive. 1,3-butadiene is formed in internal combustion engine exhaust by the incomplete combustion of the fuel and is assumed not present in evaporative and refueling emissions. The Health Risk Assessment of 1,3-Butadiene (EPA/600/P-98/001A, February 1998), concludes that 1,3-butadiene is a known human carcinogen, based on three types of evidence : 1) excess leukemia in workers occupationally exposed to 1,3-butadiene (by inhalation), 2) occurrence of a variety of tumors in mice and rats by inhalation, and 3) evidence in animals and humans that 1,3-butadiene is metabolized into genotoxic metabolites. Other health effects due to very high levels of exposure include heart, blood and lung diseases.

Since air toxic levels generally decrease in proportion to overall emissions once emission control technology is applied, the amount of benzene and 1,3-butadiene produced by new small SI engines should diminish after this rule becomes effective. Consequently, exposure to HAPs from new nonhandheld engines would be reduced, as would associated health and environmental effects. Although there is little data on direct health effects of small SI engines, the Swedish study concludes benzene emissions from chain saw engines as being rather high. No study has been conducted involving the health effects of HAP emissions specifically from nonhandheld engines.

6. Particulate Matter

Particulate matter, a term used for a mixture of solid particles and liquid droplets found in the air, has been linked to a range of serious respiratory health problems. These fine particles are of health concern because they easily reach the deepest recesses of the lungs. Batteries of scientific studies have linked particulate matter, especially fine particles (alone or in combination with other air pollutants), with a series of significant health problems including premature death, aggravated asthma and chronic bronchitis and increased hospital admissions. EPA has recently (July 1997) announced new NAAQS standards for particulate matter (PM) , by adding two new primary PM2.5 standards set at concentrations of 15 micrograms per cubic meter ($^{\mu g/m3}$), annual arithmetic mean, and 65$^{\mu g/m3}$, 24-hour average, to provide increased protection against the PM-related health effects found in community studies.

B. Cost and Cost-Effectiveness

EPA has calculated the cost-effectiveness of this rule by estimating costs and emission benefits for these engines. EPA made best estimates of the combination of technologies that an engine manufacturer might use to meet the new standards, best estimates of resultant changes to equipment design, engine manufacturer compliance program costs and engine fuel savings in order to assess the expected economic impact of the Phase 2 emission standards. Emission benefits are taken from the results of the environmental benefit assessment (see section III.A, above). The cost-effectiveness result of this rule is $852 per ton of HC+NOx when fuel savings are not taken into account. When fuel savings are also considered, the cost-effectiveness calculation results in - $507 per ton of HC+NOx. This section describes the background and analysis behind these results.

The analysis for this rulemaking is based on data from engine families certified to EPA's Phase 1 standards, as of September 1998, and information on the latest technology development and related emission levels since the publication of the NPRM. The analysis does not include any production volumes that are covered by California ARB's standards. California ARB will implement emission standards for many of these engines prior to the federal Phase 2 regulations. Therefore, this rule only accounts for costs for each engine sold outside California and those engines sold in California that are not covered by the California ARB rules, such as those used in farm and construction equipment. Although EPA expects that engines already designed to meet California ARB's current standards would incur no additional design cost to meet federal

standards, no effort was made to estimate which models would be sold in California and subject to California "Tier 1" standards.[19] Rather, for the purpose of this final rule, any Phase 1 engine design that would need to be modified to meet Phase 2 standards was assumed to incur the full cost of that modification, including design cost. Similarly, the cost to equipment manufacturers was assumed to be fully attributed to this federal rule even if an equipment manufacturer would have to make the same modifications in response to the California ARB regulation. The details of EPA's cost and cost-effectiveness analyses can be found in Chapters 4 and 7 of the Final Regulatory Impact Analysis (RIA) for this rule.

1. Engine Technologies

Table 5 lists the changes in technology, compared to Phase 1 engines, that have been considered in the cost estimation for this rulemaking. As discussed in section IV.A of this preamble, the standards would require different engine improvements amongst the nonhandheld and handheld engines and engine designs within those classes. For example, Class I and II side valve (SV) design engines are expected to require conversion to clean overhead valve (OHV) designs to reduce new engine out emissions and increase emission durability. Some OHV engine families in Class I and II are expected to decrease emissions through the use of enleanment,

[19]For purposes of analyzing small engine and equipment manufacturer impacts of this rule, including the benefits of the small volume flexibilities being adopted, EPA considered that those manufacturers who are located in California are likely to be marketing their engines and equipment in California and thus will be directly impacted by California's rules, not EPA's Phase 2 rules; this assumption, however, was not used in the development of the overall cost and cost effectiveness of EPA's Phase 2 rules. Therefore, these industry cost values are slightly overstated and the cost effectiveness numbers are slightly overstated.

increased cooling and internal redesign such as piston ring design improvements. Additional detail regarding the impact of these modifications can be found in Chapters 3 and 4 for the Final RIA.

Table 5
Potential Technology Improvements Per Class and Engine Design

Class	**Engine Design**	**Technologies**
I	4 stroke - SV	Clean OHV or other innovative fuel system technologies
I	4 stroke - OHV	Carburetor Improvements Combustion Chamber Improvements and Intake System Improved Oil Consumption (Piston oil control rings, valve stem seals)
I	2 stroke	Conversion to 4-stroke and clean OHV
II	4 stroke - SV	Conversion to clean OHV
II	4 stroke - OHV	Carburetor Improvements Combustion Chamber Improvements and Intake System Improved Oil Consumption (Piston oil control rings, valve stem seals)

2. Engine Costs

The engine cost increase is based on incremental purchase prices for new engines and is comprised of variable costs (for hardware, assembly time and compliance programs), and fixed

costs (for R&D and retooling). Variable costs were applied on a per engine basis and fixed costs were amortized at seven percent over five years. Engine technology cost estimates were based on the study by ICF and EF&EE in October 1996 entitled "Cost Study for Phase Two Small Engine Emission Regulations" and confidential cost estimates provided by industry. Details of the assumed costs and analysis can be found in Chapters 4 and 7 of the RIA.

Analysis of the EPA Phase 1 certification database, as of September 1998, was conducted to determine a potential impact of the Phase 2 standards on each manufacturer assuming use of the ABT program available to engine manufacturers. While ABT is permitted across classes, this analysis considered only ABT within each class since some manufacturers produce substantially in only one nonhandheld class. The choice of technologies for emission improvement of these engine families was based on the engine family that would be most influential in reducing a manufacturer's overall average emission level within that class. In addition, costs in the NPRM for conversion from SV to OHV were updated based on a letter received from one major engine manufacturer which asserted the NPRM cost estimates were incomplete. The cost analysis was updated with consideration of confidential cost information from several engine manufacturers in order to most accurately reflect expected costs.

For Class I, review of the September 1998 EPA Phase 1 database showed that 31 percent of the engine families, 8 SV engine families and 11 Class I OHV engine families, will need to incorporate at least some of the technologies listed in Table 5. For Class II, review of the September 1998 EPA Phase 1 certification database shows that 17 percent of the engine families,

4 Class II SV engine families and 22 OHV engine families, will need to incorporate emission improvements from amongst those listed in Table 5. The incorporation of such technologies will require both variable and fixed expenditures.

The Phase 2 emission standards for this diverse industry will impact companies differently depending on a company's current product offering and related deteriorated emission characteristics used in establishing FELs for use in averaging emissions across engine families. Some large companies may improve the emission characteristics of their large volume engine families to provide credits for their smaller volume families. These companies may also improve a few engine families notably or all of their engine families slightly. The real world impact on engine manufacturers will be influenced by many factors including their ability to reduce the emissions from their major impact engine family in light of competition with others in the marketplace.

3. Equipment Costs

While equipment manufacturers would bear no responsibility for meeting emission standards, they may need to make changes in the design of their equipment models to accommodate the Phase 2 engines. EPA's treatment of the impacts of the program therefore includes an analysis of costs for equipment manufacturers. The 1996 PSR EOLINK database was utilized as the source of information for equipment manufacturers, with models and sales estimates covering all classes. The costs for equipment conversion for nonhandheld equipment

was derived from the ICF/EF&EE cost study[20] and improved through the work by ICF and EPA on the small business impact analyses for this rulemaking. For Class I EPA conducted its own analysis using PSR estimated production data and employment and financial information from Dunn and Bradstreet. Full details of EPA's cost analysis can be found in Chapter 4 of the RIA. EPA has assumed that capital costs would be amortized at seven percent over ten years.

This rulemaking assumes that the majority of Class I engines will be converted from SV to OHV design in order to meet the emission standards. The major equipment types that use Class I engines are lawnmowers, generator sets, pumps, and tillers. For lawnmowers, it is assumed that the Class I engine redesign would have a minimal impact on equipment redesign for small volume manufacturers and a potential impact on larger volume manufacturers. This understanding is based on several factors. First, it is EPA's understanding that the smaller volume, and some larger volume, equipment manufacturers for niche markets allow space for a variety of engines to be used on their equipment. Therefore these equipment manufacturers will have nearly no equipment impacts. Second, it is EPA's understanding that some larger equipment manufacturers may have incorporated close packaging around the engine in order to be unique in the marketplace. However, the conversion from SV to OHV is not required until August 1, 2007 (except for new engine models initially produced on or after August 1, 2003) and therefore it is assumed that this long lead time will provide equipment manufacturers the time to incorporate equipment redesigns and replace tooling dies prior to this date and within the cycle of

[20]ICF and Engine, Fuel and Emissions Engineering, Incorporated; "Cost Study for Phase Two Small Engine Emission Regulations", Draft Final Report, October 25, 1996, in EPA Air Docket A-93-29, Item #II-A-04.

equipment redesign and/or tooling replacements. The same assumptions have been made for the applications of generator sets, pumps and tillers.

The Class II engine change from SV to OHV design will have a large impact on equipment changes. Review of the PSR database for equipment manufacturers that utilize Class II SV engines reveals that the majority (90 percent) of small engine equipment is produced from 32 companies with the remaining 353 companies representing only 10 percent of the overall production. EPA's work analyzing small business impacts, as summarized in the work with ICF Incorporated,[21] indicates that many of the small businesses, indicated by the PSR database to use SV Class II engines, have already converted or are in the process of converting to using OHV engine design due to market forces or changes in their engine manufacturer's offerings. These companies tend to produce professional or commercial equipment and competition has driven the use of OHV engines. The study also revealed that at least one equipment manufacturer that produces a large volume of equipment has already switched its lines from SV to OHV. For this analysis, EPA assumed that, except for this one large manufacturer, all other manufacturers will convert their engines to the use of OHV designs in direct response to this rule with all such cost attributable to this rule. EPA has assumed that any switch from SV to OHV engines by equipment manufacturers is a cost incurred due to this rulemaking. The cost estimates were based on equipment application (garden tractor, tiller, commercial turf, etc.) and in the case of the commercial turf equipment, on the power of the engine within that application.

[21]"Small Business Impact Analysis of New Emission Standards for Small Spark-Ignition Nonroad Engines and Equipment", ICF Incorporated, September 1997, located in EPA Air Docket A-96-55, Item#II-A-01 .

4. Operating Costs

The total life-cycle operating costs for this rulemaking include any expected decreases in fuel consumption. Life cycle costs have been calculated per class using the NONROAD emission model. The model calculates fuel savings from the years of implementation to 2027 and takes into account factors including equipment scrappage, projected yearly sales increase per equipment type and engine power. Details on the assumptions and calculations on fuel savings are included in Chapter 4 and 7 of the RIA.

A fuel consumption savings of 15 percent has been assumed from Class I and Class II SV engines as they are converted to OHV design. OHV designs are expected to result in improved fuel economy since data show that OHV engines can run at leaner air-to-fuel ratios than SV engines.

5. Cost Per Engine and Cost-Effectiveness

a. Cost Per Engine

Total costs for this rulemaking vary per year as engine families are phased-in to compliance with the Phase 2 standards over several years, capital costs are recovered and compliance programs are conducted. The term “uniform annualized cost” is used to express the cost of this rulemaking over the years of this analysis.

The methodology used for estimating the uniform annualized cost per engine is as follows. Cost estimates from 1995 to 1997, for technology and compliance programs respectively, were estimated and calculated to 1998 dollars through multiplication of the estimates by the applicable GDP implicit price deflators. The Phase 1 database was then analyzed, using ABT per manufacturer, to determine 1) the number of engine families per class, 2)the total number of engines per engine design, and 3) the year of technology implementation. The total estimated variable and capital costs per year were then calculated by multiplying the number of engine families and corresponding production volume by the fixed and variable costs per technology grouping, respectively. For compliance program costs, the costs for certification bench aging were estimated based on the number of families in the 1998 database and the expected certification date in the phase in. The variable costs are marked up to estimate cost to the consumer. Markups include 16 percent by the engine manufacturer, 5 percent by the equipment manufacturer and 5 percent by the mass merchandiser. All costs per year were then discounted seven percent to the first year of Phase 2 regulation per class, 2007 for Class I and 2001 for Class II. A uniform annualized cost was then calculated. Costs per engine are calculated from the uniform annualized cost for the first full year of implementation of the Phase 2 standard, 2007, and the last year of this analysis, 2027. The average cost per engine is calculated from these two values and the results are presented in Table 6 in 1998 dollars.

The yearly fuel savings (tons/yr) per class were calculated using the NONROAD model. The yearly fuel savings (tons/yr) from 2001-2027 were converted to savings ($) through conversion to gallons per year multiplied by $0.794 (a 1995 average refinery price to end user,

without taxes adjusted to 1998 dollars). The yearly fuel savings were then discounted by 7 percent to the first year of Phase 2 regulation, for each Class. The yearly results were totaled and then divided by an annualized factor to yield the uniform annualized fuel savings. The fuel savings for each engine class was calculated for the production years of 2010 and 2025. The average of these two values was utilized as the average fuel savings per engine per class per year as is shown in Table 6.

The average resultant cost per engine class is calculated by subtracting the average fuel savings from the average cost, see Table 6. See Chapter 7 of the RIA for more details of this analysis.

Table 6
Engine Yearly Fuel Savings and Resultant Cost Per Engine
Engine Costs Based on Uniform Annualized Costs
(1998$)

Class	Cost Per Engine	Savings Per Engine	Resultant Cost Per Engine
I	$19.63	$14.22	$5.41
II	$12.64	$55.72	($43.08)

b. Cost-Effectiveness

EPA has estimated the cost-effectiveness (i.e., the cost per ton of emission reduction) of the HC+NOx standard over the typical lifetime of the nonhandheld equipment that would be covered by today's rule. EPA has examined the cost-effectiveness by performing a nationwide cost-effectiveness analysis in which the net present value of the cost of compliance per year is

divided by the fleet turnover. The resultant cost-effectiveness is $852 cost/ton HC+NOx without fuel savings and -$507 with fuel savings. Chapter 7 of the RIA contains a more detailed discussion of the cost-effectiveness analysis.

The overall cost-effectiveness of this rule on HC+NOx emission reductions, with fuel savings, is shown in Table 7. Table 7 contains the cost effectiveness of other nonroad rulemakings, which reflect fuel savings, to which the cost-effectiveness of this rulemaking can be compared.

Table 7
Cost-effectiveness of the Phase 2 Standards With Fuel Savings Compared to Other Nonroad Rules

Standard	NPV Cost/NPV Ton (With Fuel Savings)	Pollutants
Phase 2 Small SI Nonhandheld Engines <19 kW Phase 2	-$507	HC+NOx
Small SI Engines <19 kW Phase 1	$217	HC+NOx
Spark Ignition Marine Engines	$1000	HC
Nonroad CI Tier 2/3 Standards	$410-$650	HC+NOx

*note: not all in the same year dollars Cost Per Engine and Cost-Effectiveness

IV. Public Participation

The process for developing this final rule provided several opportunities for formal public comment. EPA published an Advance Notice of Proposed Rulemaking (ANPRM) in March 1997 (see 62 FR 14740, March 27, 1997) which announced the signing of two Statements of Principles (SOPs) with the small engine industry and several other interested parties. The ANPRM and included SOPs outlined programs which would increase the stringency of the small engine regulations compared to Phase 1 rules. Comments were received in response to this ANPRM which, in combination with the programs outlined in the ANPRM, formed the basis of the Notice of Proposed Rulemaking (NPRM) which was published in January 1998 (63 FR 3950, January 27, 1998). A public hearing was held on February 11, 1998 during which oral testimony was received on the proposal. Written comments were received during the formal comment period for the proposal and some additional written comments were received after the formal comment period closed. To expand upon comments received during the comment period and to address specific questions EPA had of the industry regarding technical feasibility and cost of some options for the final standards, EPA also solicited and received additional information after the close of the formal comment period and participated in a number of phone conversations and meetings with industry representatives for this purpose. All of this information including documentation of phone calls and meetings has been included in the docket for this final rule.

Since considerable information was received after the formal comment period closed, a notice of availability of this supplemental information was also published on December 1, 1998 (63 FR 66081) alerting interested parties to the availability of this supplemental information. All information received, regardless of the date of receipt, was, to the maximum extent possible, considered in the development of this final rule. EPA has prepared a detailed Summary and Analysis of Comments document which describes the comments received since the publication of the NPRM and presents the Agency's response to each of these comments. The Summary and Analysis of Comments document is available in the docket for this rule.

V. Administrative Requirements

A. Administrative Designation and Regulatory Analysis

Under Executive Order 12866, the Agency must assess whether this regulatory action is "significant" and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order (58 FR 51735, Oct. 4, 1993). The order defines "significant regulatory action" as any regulatory action that is likely to result in a rule that may:

(1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) create a serious inconsistency or otherwise interfere with an action taken or planned

by another agency;

(3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or,

(4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, EPA has determined that this rulemaking is a "significant regulatory action" because the new standards and other regulatory provisions, are expected to have an annual effect on the economy in excess of $100 million. A Regulatory Impact Analysis has been prepared and is available in the docket associated with this rulemaking. This action was submitted to OMB for review as required by Executive Order 12866. Any written comments from OMB are in the public docket for this rulemaking.

B. Regulatory Flexibility

EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. The Agency has also determined that this rule will not have a "significant impact on a substantial number of small entities."

EPA has identified industries that are subject to this rule and has contacted small entities and small entity representatives to gain a better understanding of potential impacts of the Phase 2 program on their businesses. This information was useful in estimating potential impacts of this

rule on affected small entities, the details of which are more fully discussed in Chapter 8 of the Final RIA. Small not-for-profit organizations and small governmental jurisdictions are not expected to be impacted by this proposal. Thus EPA's impact analysis focuses on small businesses. For purposes of the impact analysis, "small business" is defined by number of employees, according to published Small Business Administration (SBA) definitions.

The Agency desires to minimize, to the extent appropriate, impacts on those companies which may be adversely affected, and to ensure that the emissions standards are achievable. Thus, flexibility provisions for the rule (discussed in section II.E.) were developed based on analysis of information gained through discussions with potentially affected small entities as well as analysis of other sources of information, as detailed in Chapter 8 of the Final RIA. Many of the flexibilities in today's rule should benefit both engine and equipment manufacturers qualifying as small.

The economic impact of the final rule on small engine and equipment manufacturers was evaluated using a "sales test" approach which calculates annualized compliance costs as a function of sales revenue. The ratio is an indication of the severity of the potential impacts. EPA expects that, at worst, four small engine manufacturers and 70 small equipment manufacturers would be impacted by more than one percent of their sales revenue. EPA guidance provides that if fewer than 100 small entities are affected by more than one percent of their annual sales income, this does not amount to a "significant impact on a substantial number" of small entities. This base case analysis assumes that no manufacturers take advantage of the flexibilities being

offered and that there would be no passthrough of costs in price increases, and can therefore be characterized as depicting worst-case impacts. Thus, EPA expects today's rule to have a minimal impact on small business entities.

However, EPA is finalizing a number of flexibilities to further reduce the burden of compliance on small-volume engine or equipment manufacturers and small-volume product lines. The Agency received a number of comments from engine manufacturers which were generally supportive of the flexibilities initially proposed, but which suggested changes in production caps and other provisions. EPA has incorporated many of these suggested changes to the extent possible, keeping in mind equity and air quality considerations. Given the flexibilities being afforded to the engine and equipment manufacturers, the results of the analysis suggest that of those small entities analyzed, only three small business engine manufacturers and three small business equipment manufacturers would likely experience an impact of greater than one percent of their sales revenue. These six companies represent only about three percent of the total number of small business manufacturers on which the analysis was based. Other outreach activities have also indicated that the impact of today's rule can be minimized given sufficient lead time to incorporate the new technology with normal model changes. Again, the Agency has not attempted to quantify the beneficial impact on small business manufacturers of the lead time provided (which can include delaying the impact of these rules up until the 2010 model year).

Some, but not all, of the flexibility provisions were considered in the impact assessment on small entities (see Chapter 8 of the Final RIA). Those flexibilities not considered include a

hardship relief provision (described in section II.E.), which was developed to further ensure the standards can be achieved. Although it is difficult to project utilization of such a provision, EPA expects that it could further reduce the economic impact of the rule.

The results of the impact analysis show minimal impacts on small businesses. EPA expects that such impacts will be negligible if small companies take advantage of the above-mentioned flexibilities, and if companies are able to pass through most of their costs through to customers, as was considered likely by most small companies contacted. Many of these entities are involved in filling niche markets, and are thus in a better position to pass these costs along to the ultimate consumers. Furthermore, EPA's outreach activities with small entities indicated that many engine and equipment manufacturers have already begun the switch from side-valve engine technology to producing or using overhead valve engine technology for reasons other than today's rule. They should therefore not incur substantial additional costs as a result of this program. The ample lead time being afforded by today's rule should also allow for an orderly transition to the more advanced technology.

C. Paperwork Reduction Act

The information collection requirements in this rule will be submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. An Information Collection Request (ICR) document has been prepared by EPA and a copy may be obtained from Sandy Farmer by mail at OPPE Regulatory Information Division;

U.S. Environmental Protection Agency (2137); 401 M St., S.W.; Washington, DC 20460, by email at farmer.sandy@epamail.epa.gov, or by calling (202) 260-2740. A copy may also be downloaded off the internet at http://www.epa.gov/icr. The information requirements are not effective until OMB approves them.

The information planned to be collected via this final rule is necessary to assure that the engine manufacturers required to seek certification of their engines have fulfilled all the essential requirements of these regulations. In particular, this information will document the design of the engine for which certification is sought, the type(s) of equipment in which it is intended to be used and the emission performance of these engines based upon testing performed by or on behalf of the engine manufacturer. Additional, essential information is necessary to document the results of testing performed by the manufacturer under a mandated production line testing program to determine that the engines, as manufactured continue to have acceptable emission performance. Finally, if the manufacturer elects to conduct testing of in-use engines under a voluntary in-use testing program adopted in these final regulations, information is necessary to document the results of that in-use testing program.

Table 8 provides a listing of this rulemaking's information collection requirements along with the appropriate information collection request (ICR) numbers. The cost of this burden has been incorporated into the cost estimate for this rule. The Agency has estimated that the public reporting burden for the collection of information required under this rule would average approximately 156,816 hours annually for the industry at an estimated annual cost of $9,489,386. The hours spent by an individual manufacturer on information collection activities in any given

year would be highly dependent upon manufacturer specific variables, such as the number of engine families, production changes, emission defects etc.

Table 8: Public Reporting Burden		
EPA ICR No.	**Type of Information**	**OMB Control No.**
151490	Certification	2060-0338
23420	Averaging, banking and trading	2060-0338
N/A	Production line testing	N/A
0095.07	Pre-certification and testing exemption	2060-0007
0012	Engine exclusion determination	2060-0124
0282	Emission defect information	2060-0048
1673.01	Importation of nonconforming engines	2060-0294

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An Agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.

D. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 ("Unfunded Mandates Act") requires that the Agency prepare a budgetary impact statement before promulgating a rule that includes a Federal mandate that may result in expenditure by State, local, and tribal governments, in aggregate, or by the private sector, of $100 million or more in any one year. Section 203 requires the Agency to establish a plan for obtaining input from and informing, educating, and advising and small governments that may be significantly or uniquely affected by the rule.

Under section 205 of the Unfunded Mandates Act, the Agency must identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a budgetary impact statement must be prepared. The Agency must select from those alternatives the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule, unless the Agency explains why this alternative is not selected or the selection of this alternative is inconsistent with law.

Because this final rule is estimated to result in the expenditure by State, local and tribal governments or the private sector of greater than $100 million in any one year, the Agency has prepared a budgetary impact statement and has addressed the selection of the least costly, most cost-effective or least burdensome alternative. While this rule does not impose enforceable obligations on state, local, and tribal governments, which do not produce small SI nonhandheld

engines or equipment, EPA has estimated the rule to cost the private sector an annualized cost of $230 million per year. However, the Agency has appropriately considered cost issues in developing this rule as required by section 213(a)(3) of the Clean Air Act, and has designed the rule such that it will in EPA's view be a cost-effective program. Because small governments would not be significantly or uniquely affected by this rule, the Agency is not required to develop a plan with regard to small governments.

The unfunded mandates statement under section 202 must include: (1) a citation of the statutory authority under which the rule is adopted; (2) an assessment of the costs and benefits of the rule including the effect of the mandate on health, safety and the environment; (3) where feasible, estimates of future compliance costs and disproportionate impacts upon particular geographic or social segments of the nation or industry; (4) where relevant, an estimate of the effect on the national economy; and (5) a description of the EPA's consultation with state, local, and tribal officials. Since this rule is estimated to impose costs to the private sector in excess of $100 million per year, it is considered a significant regulatory action. Therefore, EPA has prepared the following statement with respect to UMRA sections 202 through 205.

1. Statutory Authority

This rule establishes standards for emissions of HC+NOx and CO from small nonroad SI nonhandheld engines pursuant to section 213 of the Clean Air Act. Section 216 defines the terms "nonroad engine" and "nonroad vehicle." Section 213(a)(3) requires these standards to achieve

the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the engines or vehicles to which such standards apply, giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers and to noise, energy, and safety factors associated with the application of such technology. Section 213(b) requires the standards to take effect at the earliest possible date considering the lead time necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period and energy and safety. Section 213(d) provides that the standards shall be subject to sections 206, 207, 208 and 209 of the CAA, with such modifications of the applicable regulations implementing such sections as the Administrator deems appropriate, and shall be enforced in the same manner as standards prescribed under section 202. Therefore, the statutory authority for this rule is as follows: sections 203, 204, 205, 206, 207, 208, 209, 213, 215, 216, and 301(a) of the Clean Air Act, as amended. Moreover, this rule is being issued pursuant to a court order entered in Sierra Club v. Browner, No. 93-0124 and consolidated cases (D.D.C.).

2. Social Costs and Benefits

The social costs and benefits of this rule are discussed in detail in sections III.A. and III.B. of this notice, and in Chapters 3 through 8 of the Final RIA. Those discussions are incorporated into this statement by reference.

3. Effects on the National Economy

As stated in the UMRA, macroeconomic effects tend to be measurable, in nationwide economic models, only if the economic effect of the regulation reaches 0.25 to 0.5 percent of gross domestic product (in the range of $15 billion to $30 billion). A regulation with a smaller aggregate effect is highly unlikely to have any measurable impact in macroeconomic terms unless it is highly focused on a particular geographic region or economic sector. Because the economic impact of the small SI nonhandheld engine Phase 2 rule is far less than these thresholds, no estimate of this rule's effect on the national economy has been conducted.

4. Consultation with Government Officials

Today's rule does not create a mandate on state, local or tribal governments, since it does not impose any enforceable duties on these entities which do not produce small SI nonhandheld engines or equipment. Thus, EPA did not consult with state, local or tribal governments in the context of discussing mandated costs that would apply to such governments. However, EPA did consult with state governmental representatives, and with representatives of associations representing state air regulatory agencies, in the contexts of developing the most stringent achievable regulations and of addressing state ozone attainment needs. The consulted entities include the California ARB, the Wisconsin DNR, and NESCAUM. These consultations are documented in the record for this rule, and are reflected and discussed in the SOPs, the ANPRM, the NPRM, the Notice of Availability, and today's final rulemaking notice.

5. Regulatory Alternatives Considered

The Clean Air Act requires that standards under section 213(a)(3) result in the greatest degree of emission reductions achievable from available technology, considering costs, lead time, noise, energy and safety factors. While EPA has substantial discretion to weigh these different factors in setting standards under section 213(a)(3), EPA may not simply select the least costly, most cost-effective, or least burdensome method of achieving the objectives of the rule if such method does not obtain the greatest achievable emission reduction. In order to ensure the cost-effectiveness of this rule and still fulfill the intent of the Clean Air Act, EPA has adopted numerous flexibility provisions that reduce the burden of the Phase 2 program for small volume manufacturers and manufacturers of small volume models and families. These provisions are discussed in section II.E. of today's notice. Moreover, the technological options considered for the rule's standards and related provisions are discussed in section II.A. of the notice. Section II.B. discusses the ABT program adopted for the final rule, and section II.D. discusses the compliance program for Phase 2 nonhandheld engines. In EPA's view, these discussions demonstrate that the Agency is adopting the most cost-effective rule allowed under section 213(a)(3) for nonhandheld Phase 2 engines, and the Agency incorporates them into this statement.

E. Congressional Review Act

The Congressional Review Act, 5 U.S.C. § 801 et seq., as added by the Small Business

Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the Federal Register. This rule is a "major rule" as defined by 5 U.S.C. § 804(2). This rule will be effective [**insert date 60 days following publication in the Fed. Reg or submission to Congress/GAO, whichever is later**].

F. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Pub L. No. 104-113, § 12(d) (15 U.S.C. 272 note), directs EPA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This final rule involves technical standards. While commenters suggested the use of ISO 8178 test procedures for measuring emissions, the Agency has decided not to rely on the ISO

procedures in this rulemaking. The Agency has determined that these procedures would be impractical because they rely too heavily on reference testing conditions. Since the test procedures in these regulations need to be used not only for certification, but also for production line testing, selective enforcement audits, and in-use testing, they must be broadly based. In-use testing is best done outside tightly controlled laboratory conditions so as to be representative of in-use conditions. EPA has determined that the ISO procedures are not sufficiently broadly usable in their current form for this program, and therefore cannot be adopted by reference. EPA has instead chosen to continue to rely on the procedures outlined in 40 CFR Part 90. EPA is hopeful that future ISO test procedures will be developed that are usable for the broad range of testing needed, and that such procedures could then be adopted by reference.

G. Executive Order 13045

Executive Order 13045, entitled "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885, April 23, 1997), applies to any rule that: 1) was initiated after April 21, 1997 or for which a Notice of Proposed Rulemaking was published after April 21, 1998; 2) is determined to be "economically significant" as defined under Executive Order 12866; and 3) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets all three criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children; and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to Executive Order 13045, because substantive actions were initiated before April 21, 1997 and EPA published a Notice of Proposed Rulemaking before April 21, 1998. Moreover, this rulemaking does not involve risk assessments in which EPA would consider risks to infants and children. This is because today's rule is intended to result in the greatest achievable emissions reductions that are technically feasible, rather than to achieve a threshold of protecting public health and the environment. Therefore, EPA does not have reason to believe this action involves environmental health and safety risks that present a disproportionate risk to children.

H. Executive Order 12875: Enhancing the Intergovernmental Partnership

Under Executive Order 12875, EPA may not issue a regulation that is not required by statute and that creates a mandate upon a State, local or tribal government, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by those governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 12875 requires EPA to provide to the Office of Management and Budget a description of the extent of EPA's prior consultation with representatives of affected State, local and tribal governments, the nature of their concerns, copies of any written communications from the governments, and a statement supporting the need to issue the regulation. In addition, Executive Order 12875 requires EPA to develop an effective process permitting elected officials and other representatives of State, local and tribal governments "to provide meaningful and

timely input in the development of regulatory proposals containing significant unfunded mandates."

Today's rule does not create a mandate on State, local or tribal governments. The rule does not impose any enforceable duties on these entities, which do not produce small SI nonhandheld engines or equipment. Accordingly, the requirements of section 1(a) of Executive Order 12875 do not apply to this rule.

I. Executive Order 13084: Consultation and Coordination with Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget a description of the extent of EPA's prior consultation with representatives of affected tribal governments and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments "to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities."

Today's rule does not significantly or uniquely affect the communities of Indian tribal governments because it imposes no enforceable obligations on them. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

VI. Statutory Authority

Authority for the actions set forth in this rule is granted to EPA by sections 202, 203, 204, 205, 206, 207, 208, 209, 213, 215, 216, and 301(a) of the Clean Air Act as amended (42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a)).

List of Subjects

40 CFR Part 90

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Labeling, Nonroad source pollution, Reporting and record keeping requirements, Research, Warranties.

Dated: (March 3, 1999)

_____

Carol M. Browner,

Administrator